

10. *South African Parasitic Copepoda*.—By K. H. BARNARD, D.Sc., F.L.S.  
(With 33 text-figures.)

This paper includes the species of South African Parasitic Copepods which have been already recorded in the literature, together with the additional species of which I have been able to examine specimens.

Most of this material is in the South African Museum collections, but I wish to thank Dr. Fitzsimons, Director of the Transvaal Museum; Dr. Hewitt, Director of the Albany Museum, Grahamstown; Dr. Lawrence of the Natal Museum, and Dr. van Hille and Mr. Macnae of Rhodes University, Grahams-town, for submitting specimens for identification. Mr. A. C. Harrison of the Cape Provincial Inland Fisheries has obtained specimens from fresh-water fishes; and Mr. C. L. Biden has collected very useful material while investigating sharks, including species hitherto unrecorded from South Africa. I wish to thank also the Librarian of the Medical Library, University of Cape Town, for access to periodicals not available in the Museum.

The greater part of the South African Museum collection has been derived from the collection of marine fishes made by the Cape Government trawler s.s. *Pieter Faure*. My examination of several hundreds of fishes, however, produced only a rather surprisingly small number of parasites, especially in the case of permanently fixed parasites. Undoubtedly a considerable number of species have yet to be discovered when South African fishes are specially examined for parasites as soon as possible after capture.

Although only a preliminary study, the present compilation may be useful for future work. A list of the South African hosts with their parasites is given at the end of this paper.

Suborder ARGULOIDA

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 11.

Fam. ARGULIDAE

1902. Wilson, *Proc. U.S. Nat. Mus.*, xxv, pp. 635 sqq. (review of family).

1904. Thiele, *Mitt. Zool. Mus. Berlin.*, ii, pp. 5 sqq.

1928. Monod, *Rev. Zool. Bot. Afric.*, xvi, pp. 242 sqq. (African genera and species, with keys).

1943. Ringuélet, *Rev. Mus. la Plata*, n.s. iii, no. 19, pp. 43 sqq. (neotropical species).

1947. Brian, *An. Mus. Argent.*, xlii, pp. 353 sqq. (S. American species).

1948. Ringuélet, *Rev. Mus. la Plata*, v, no. 33, pp. 281 sqq. (neotropical species).

Sexes alike. Body flattened; cephalothorax shield-like, consisting of fused head and 1st thoracic segment; 3 free thoracic segments; abdomen unsegmented, bilobed. Eyes distinct. Four pairs of biramous swimming legs, with plumose setae. No ovisacs; eggs attached to stones and other objects.

Marine, estuarine, and fresh water. On the skin, fins, and in the branchial chamber of fishes. Also on tadpoles. Both sexes leave the host at the breeding season, and the eggs are laid on any suitable surface, in single rows, each row containing 3–25 eggs. Monod gives a figure of eggs scattered more or less singly on a fish scale. The larvae when hatched are in general shape similar to the adult. Accessory sexual structures in male present on the basal joints of the posterior legs.

Although fresh-water members of this family are numerous in Central Africa, their occurrence in southern Africa, especially the extreme south, appears to be rare. In parts of Rhodesia, however, e.g. the Matopo Dam, a heavy infestation has been recorded (Hey, 'Inland Fish. Dept., Cape, Rep. no. 3.' 1946, p. 34).

*Key to African genera*

- |  |  |                    |
|--|--|--------------------|
| 1. No ventral sucking discs.   |  | <i>Dolops</i>      |
| 2. Ventral sucking discs.  |  |                    |
| a. One pair of antennae. Cephalothorax constricted anteriorly. Thorax elongate.  |  | <i>Chonopeltis</i> |
| b. Two pairs of antennae. Cephalothorax subcircular or elliptical. Thorax short. |  | <i>Argulus</i>     |

*Gen. Dolops* Audouin

1837. Audouin, *Ann. Soc. ent. Fr.*, vi, p. xiii ('nom. nud.' apud Neave. Nomencl. Zool.).
1857. Heller, *SB. Ak. Wiss. Wien. math. nat. kl.*, xxv, p. 89 (*Gyropeltis*).
1891. Stuhlmann, *Zool. Jahrb. Abt. syst.*, vi, p. 152 (*Gyropeltis*).
1899. Bouvier, *Bull. Soc. Philom. Paris*, ser. 8, x, p. 53 and ser. 9, i, p. 12.
1902. Wilson, *Proc. U.S. Nat. Mus.*, xxv, pp. 638, 701 (in key), 730.
1904. Thiele, loc. cit., p. 7.
1911. Maidl, *Arb. Zool. Inst. Univ. Wien.*, xix, p. 317 (anatomy).
1928. Monod, loc. cit., p. 243 (in key).
1943. Ringuélet, loc. cit., p. 75 (S. American species).

Cephalothorax subcircular. Anterior maxillipeds hook-like, stout, with strong falciform claws, not transformed into sucking discs. Apical joint of posterior maxillipeds without claws, but with spiniferous processes. No preoral stylet.

Neave quotes Audouin's name as *nomen nudum*, but Wilson (p. 638) says Audouin's description 'establishes with sufficient accuracy the characteristics of the genus', and Bouvier and later writers accept it.

Several species in South America, one species in Africa.

*Dolops ranarum* (Stuhlmann)

Fig. 1 a–d

1891. Stuhlmann, loc. cit., p. 154, fig. (*Gyropeltis* r.).
1902. Wilson, loc. cit., p. 737, pl. 27, figs. 89 (♀), 90 (♂).

1904. Thiele, loc. cit., p. 17, pl. 6, figs. 26-31 (appendages).  
 1913. Cunningham, *Proc. Zool. Soc. Lond.*, p. 263.  
 1928. Monod, loc. cit., p. 248.  
 1940. Brian, *Rev. Zool. Bot. Afric.*, xxxiii, p. 78, figs 1-3 (♀).

Cephalothorax subcircular. Abdominal lobes narrow, 2-2½ times as long as wide, with notch on inner margin. Flagellum (an elongate setose process attached at end of 2nd basal joint of leg on its dorsal surface) on 1st and 2nd legs only. Basal joint of 3rd leg ♂ with a scabrous papilla pointing dorsally and forwards.

♀ 1.1 mm., ♂ 4.5 mm. (total length). Greyish or greenish.

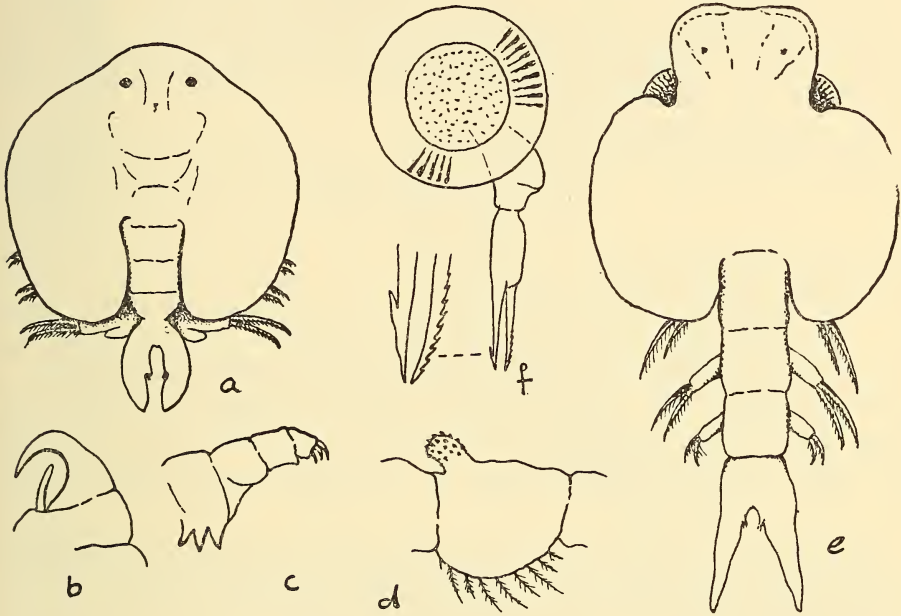


Fig. 1. *Dolops ranarum* (Stuhlmann). *a*, dorsal view; *b*, anterior maxilliped; *c*, posterior maxilliped; *d*, basal joint of 3rd leg ♂. *Chonopeltis inermis* Thiele. *e*, adult (copy after Thiele and Brian); *f*, juvenile, transformation of anterior maxilliped into sucking disc (only some of the supporting rods shown).

*Localities.* Hartebeest Poort dam, Pretoria, mouth and gills of *Tilapia mossambica* (Transvaal and Albany Museums); Aapies River, near Pretoria, on *Barbus gunningi* (Transv. Mus.); Olifants River, Middelburg, on *Barbus swierstrae* (Transv. Mus.); Matopo dam, Bulawayo, on introduced Black Bass (*Huro salmonoides*) (per A. C. Harrison, May 1950).

*Distribution.* Lake Victoria Nyanza (Stuhlmann, Cunningham), Lake Tanganyika (Cunnington), Lake Nyasa (Cunnington), White Nile (Cunnington), Lake Moero (Mweru) (Monod), Lake Albert (Brian).

On various fishes: *Protopterus*, Silurids, *Eutropius*, *Lates*. The original specimens were found on tadpoles (hence *ranarum*).

Gen. *Chonopeltis* Thiele

1900. Thiele, *Zool. Anz.*, xxiii, no. 606, p. 46.  
 1902. Wilson, loc. cit., pp. 701 (in key), 729.  
 1904. Thiele, *Mitt. Zool. Mus. Berlin*, ii, p. 43.  
 1912. Calman, *Proc. Zool. Soc. Lond.*, p. 766.  
 1928. Monod, *Rev. Zool. Bot. Afric.*, xvi, p. 244 (in key).

Front portion of cephalothorax constricted, so that the sucking discs are partially visible in dorsal view; posterior portion forming oval lateral lobes not extending to end of thorax and thus covering only the anterior 2 pairs of legs. Free segments of thorax elongate. Abdominal lobes pointed. Antenna 1 absent (see Calman, loc. cit.); antenna 2 simple, 4-jointed. Anterior maxillipeds transformed into sucking discs. Posterior maxillipeds as in *Argulus*. No preoral stylet. Secondary sexual characters in ♂ on 2nd and 4th legs, the latter with only one natatory ramus.

One species in Africa, one in Japan.

*Chonopeltis inermis* Thiele

Fig. 1 e, f

1900. Thiele, loc. cit., p. 47 (♀).  
 1902. Wilson, loc. cit., p. 729.  
 1904. Thiele, loc. cit., p. 44, pl. 9, figs. 110-116 (♀).  
 1913. Cunningham, *Proc. Zool. Soc. Lond.*, pp. 263, 280 (locality only).  
 1928. Monod, loc. cit., p. 260, pl. 1, fig. C, pl. 7, figs. C, D, E (♀).  
 1940. Brian, *Rev. Zool. Bot. Afric.*, xxxiii, p. 80, figs. 1-14 (♀, ♂, juv.) (var. *schoutedeni*).  
 1951. Darteville, *Zooleo.*, n.s. no. 9, p. 12, figs. 1, 2 (juv. ♀, juv. ♂) (var. *schoutedeni*).

Front portion of cephalothorax subquadrangular, with more or less developed median indent on front margin; ventrally front margin with chitinous border from which 2 pairs of ribs converge backwards; the antenna arises between the inner and outer rib of each pair. The length of the abdominal lobes in relation to basal portion variable (see Brian's figures). In 2 mm. juveniles (S. Afr. Mus.) the lobes are shorter than the basal portion.

Up to ♀ 10 mm., ♂ 7 mm. (Brian).

*Locality.* Okavango River, at the bases of the barbels on chin, in folds of lower lip, and in axil of pectoral fin of *Synodontis melanostictus*. (S. Afr. Mus. 3 juv.)

*Distribution.* East Africa, on 'Chromis' (*Cichlidae*) (Thiele); Lake Nyasa (Cunnington); Congo, in branchial cavity of *Gnathonemus* and *Marcusenius* (Monod, Brian).

*Remarks.* The 3 specimens in the S. African Museum are juveniles 1.75-2 mm. in length, smaller than any in Brian's material. They show the transformation of the anterior maxillipeds from a chelate appendage into a sucking disc (fig. 1f) (cf. Wilson, 1902, loc. cit., fig. 11, after Claus).

Dartevelle claims *schoutedeni* as a separate species characterized by lengthening of the hinder part of body, different shape of appendages, and particularly the smallness of the 4th pair of legs.

Gen. *Argulus* O. F. Müller

1785. Müller, *Entomotr.*, p. 121.  
 1902. Wilson, loc. cit., pp. 701 (key to species), 704.  
 1913. Cunnington, *Proc. Zool. Soc. Lond.*, p. 265 (key to African species).  
 1928. Monod, loc. cit., pp. 244 (key to African species), 249.  
 1931. id., *Rev. Zool. Bot. Afric.*, xxi, p. 18 (emendation to key).  
 1940. Brian, *ibid.*, xxxiii, p. 87.  
 1940. Meehan, *Proc. U.S. Nat. Mus.*, lxxxviii, pp. 459 sqq.  
 1943. Ringuélet, loc. cit., p. 54 (S. American species).  
 1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, pp. 551 sqq.

Cephalothorax subcircular or elliptical. Free segments of thorax short (normally). Two pairs of antennae, the anterior pair armed with stout hooks. Anterior maxillipeds transformed into sucking discs. Preoral stylet present. Secondary sexual characters in ♂ on 2nd-4th legs.

Marine and fresh water. Very few species have been obtained from marine fishes around the African coast. Monod (1928) records 4 species from the whole of the Mediterranean and western coast of Africa. Two more species are recorded below, occurring on the south-east side of the continent.

The genus is common on fresh-water fishes in Central Africa, but hitherto none have been recorded from the southern region. One species is herein described; it is evidently very rare; in the course of revising the south-west Cape fishes I have examined many thousands of specimens, both in the field and in the Museum collections, but without finding a single specimen of *Argulus*.

The following species have been recorded from localities sufficiently close to our South African area to raise a reasonable expectation that they may be found to occur actually within our boundaries. They are included in the key, but not described here.

Marine

- A. alexandrensis* Wilson 1923 (♂). Port Alexander, on *Zeus*. (syn. *otolithi* Brian 1940 (♂). Cameroons, on *Pseudotolithus*).  
*A. dartevellei* Brian 1940 (♀). Congo, on *Polynemus*.

Fresh water

- A. africanus* Thiele 1900 (♀ ♂). Lakes Nyasa and Moeru. Widely distributed in Central Africa on various fishes.  
*A. reticulatus* Wilson 1920 (♀ ♂). Congo River, on *Hydrocyon*.  
*A. wilsonii* Brian 1940 (♂). Congo River, on *Hydrocyon*.  
*A. rhipidiophorus* Monod 1931 (♀ ♂). Lake Albert, on ? *Hydrocyon*.  
*A. schoutedeni* Monod 1928 (♀ ♂). Katanga.  
*A. rijckmansii* Brian 1940 (♀). Matadi, River Congo.

Cunnington (1913) criticized Wilson's 1902 identification key on the ground that the relative length of the carapace was an unsatisfactory and inconstant

character. Wilson (1923) counter-criticized. Where the carapace is manifestly so short as to leave the last two thoracic segments completely uncovered, one may assume this condition to be natural and not produced by contraction or distortion in preservative (e.g. *schoutedeni*). Where, however, 'species' are distinguished and keys constructed according as the carapace just reaches, or just does not reach, to the base of the abdomen, or overlaps the abdomen to a greater or less extent, one does not feel on such sure ground. The varying action of different methods of preservation, or of similar preservative on different individuals, does not appear to be fully realized by all investigators.

*Key to South African species (and some other African species)*

Marine

I. Abdominal lobes pointed.

- |   |                                      |
|---|--------------------------------------|
| a. Carapace evenly elliptical, not extending beyond base of abdomen; antero-lateral sinuses slight; suckers not visible in dorsal view. | <i>alexandrensis</i>                 |
| b. Carapace elliptical, extending to middle of caudal lobes, antero-lateral sinuses deep; suckers partly visible in dorsal view.        | <i>multipocula</i>                   |
| c. Carapace narrowed in front, but without definite sinuses, extending to base of abdomen; suckers partly visible in dorsal view.       | <i>belones</i><br><i>dartevellei</i> |

II. Abdominal lobes rounded.

Fresh Water

I. Last 2 thoracic segments entirely free and visible. Abdominal lobes pointed.

*schoutedeni*

II. Carapace covering more or less all the thoracic segments and extending at least to base of abdomen.

A. Abdominal lobes rounded.

- |  |   |  |
|--|---|--|
| 1. Basal plate of maxilliped with 3 spines (2 at least acute). | { | <i>rhypidiophorus</i>                                    |
| 2. Basal plate with 3 lobes.                                   |   | <i>rijckmansii</i>                                       |
| a. Lobes close together.                                       | { | <i>africanus</i>   |
| b. Lobes widely separated by triangular spaces.                |   | <i>reticulatus</i><br><i>wilsonii</i><br><i>capensis</i> |

B. Abdominal lobes pointed (bluntly).

Wilson in 1902, and in the descriptions and explanation to figures in 1944 used the term 'Maxilliped', but in his 1944 Key followed Meehan 1940 in terming these appendages (Second) Maxillae.

*Argulus belones* van Kampen

Fig. 2

1909. Van Kampen, *Zool. Anz.*, xxxiv, p. 443, figs. 1-4 (♀).

♀—Carapace elliptical, narrowed in front, posterior lobes broadly rounded, almost reaching the abdomen. Eyes moderate, far forward, their distance apart about twice the distance of eye from lateral margin. Anterior respiratory area subsemicircular (inner margin nearly straight), well separated from the elongate reniform posterior area. Abdomen broadly ovate, a little longer than wide (5:4), sinus extending  $\frac{3}{8}$  length, narrowly triangular, lobes pointed, anal lobes minute. Antenna 1 with small claw on anterior margin, strong apical claw, and a small projection on hind margin. Antenna 2 4-jointed, sparsely setose. Suckers situated well forward, partially visible in dorsal view where the carapace narrows, completely hiding the eyes in ventral view; rods supporting the margin composed of a number of short discs or cups, each wider than long. Accessory spines between maxillipeds apparently absent. Maxilliped robust,

basal plate with large scabrous area, hind margin trilobed, the lobes rounded, the middle one smaller than the others; 2nd and 3rd joints with apical scabrous areas, 4th and 5th joints abruptly narrower than 3rd, 4th with a few scabrosities on outer margin, 5th tipped with 2 points and a spine. Basal joint of 4th leg with trapezoidal projection on hind margin, the outer posterior corner pointed. No flagella on any of the legs.

One ♀ 15 mm., two ♀♀ also with full ovaries 8 and 9 mm., one immature 5 mm. Greenish.

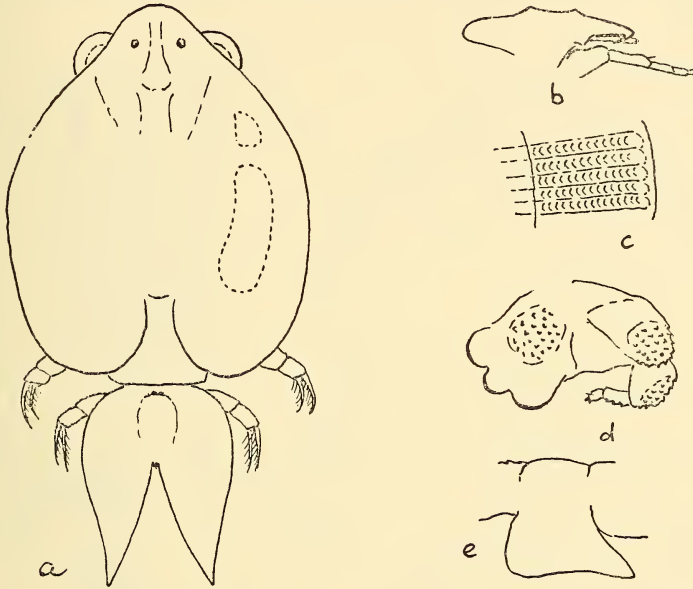


Fig. 2. *Argulus belones* van Kampen. a, ♀, respiratory areas dotted (not visible in dorsal view); b, antennae 1 and 2; c, portion of margin of sucking disc; d, posterior maxilliped; e, basal joint of 4th leg.

*Locality.* Natal, on side of head of Barracuda (*Sphyræna commersoni*) (collected by the late H. W. Bell-Marley, the largest example ex Natal Museum).

*Distribution.* Sumatra, on *Belone schismatorhynchus*.

*Remarks.* The specimens described above show all the specific features of *belones*, and are clearly conspecific. Van Kampen's 13 $\frac{3}{4}$  mm. ♀, however, had the posterior lobes of the carapace meeting ('sogar miteinander verwachsen oder verklebt') in the middle line, and extending backwards to cover half the abdomen. This shows the danger of regarding the carapace length as a constant specific character, and of utilizing it to separate species in a key.

Van Kampen mentions a pair of blunt spines between the maxillipeds, but they are not traceable in the present material.

This species is distinguished from *alexandrensis* Wilson, *arcassonensis* Cuenot, and *alosae* Gould (cf. remarks of Wilson, 1923, p. 5, and Monod, 1928, p. 255) by the lateral indentations of the carapace, and also the eyes and suckers, being much farther forward; the relatively broader and more deeply incised abdomen; the very robust proximal joints of the maxilliped with the two abruptly narrower distal joints.

So far as I am aware, this species has not been recorded since its description. Its occurrence in Natal waters, and on a fish of a different family, is therefore interesting.

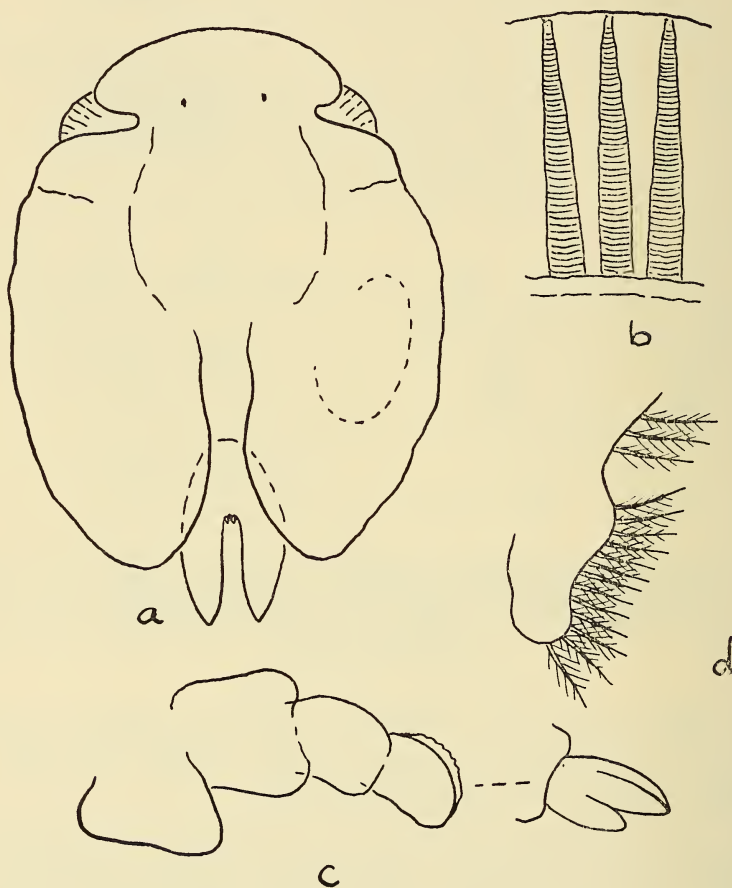


Fig. 3. *Argulus multipocula* n. sp. *a*, ♀, respiratory area dotted; *b*, portion of margin of sucking disc; *c*, maxilliped, with edgewise view of 5th joint; *d*, process of basal joint of 4th leg.



*Argulus multipocula* n. sp.

Fig. 3

♀—Carapace broadly elliptical, with deep antero-lateral sinuses, posterior lobes rounded, extending to middle of caudal lobes. Eyes distinct, separated by a distance equal to that between eye and lateral margin of carapace. Posterior respiratory area reniform, anterior area not clearly traceable, but apparently subtriangular or oval. Abdomen ovate, cleft to a little beyond middle, lobes apically pointed. Antennae 1 and 2 as in *belones*. Suckers partially visible in dorsal view in the antero-lateral sinuses of the carapace. Rods

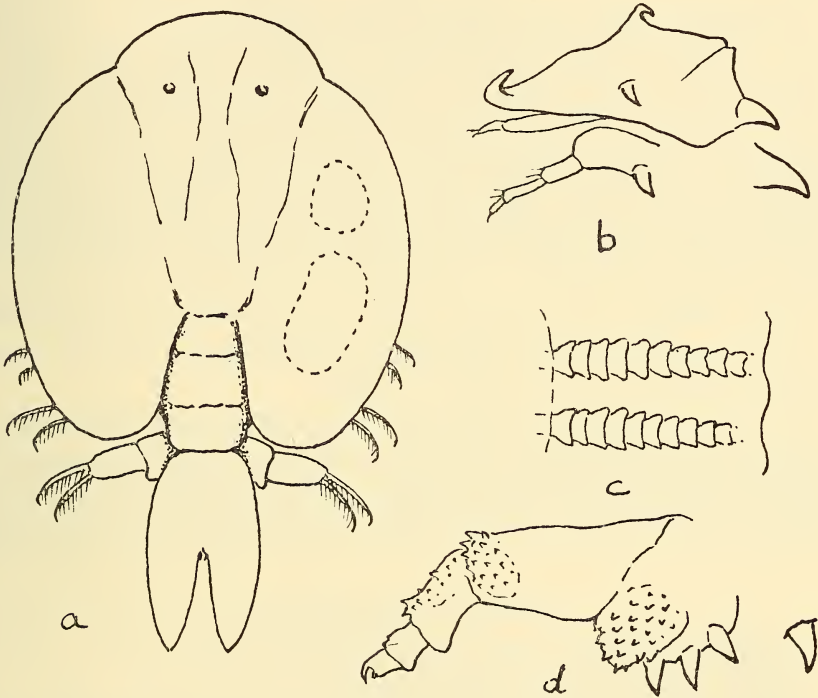


Fig. 4. *Argulus capensis* n. sp. a, ♀, respiratory areas dotted; b, antennae 1 and 2; c, portion of margin of sucking disc; d, maxilliped, with one of the pair of accessory spines.

supporting the margin composed of very numerous extremely short cups (*multipocula*) producing a transversely striated appearance. Accessory spines between maxillipeds absent. Basal plate of maxilliped trapezoidal, entire, without any lobes or spines, no scabrosities on any of the joints; 5th joint with 2 oval plates, basally fused, distally separate but adpressed, the dorsal one with scarious, minutely crenulate anterior margin. Basal joint of 4th leg with digitiform process. No flagella on any of the legs.

10 × 7 mm. (anterior margin to tips of posterior lobes of carapace 9 mm.).

*Locality.* Richards Bay, Natal. One ovigerous ♀, not attached to any host, but found among the usual miscellaneous collection of littoral animals obtained by shore collecting (University of Cape Town Ecological Survey, 1949).

*Remarks.* The distinctive specific characters are the deep antero-lateral sinuses, the entire basal plate and bifid nonunguiculate apex of the maxilliped, and the striated appearance of the supporting rods of the suckers. The latter feature invites comparison with *A. melanostictus* Wilson 1935 (see: Wilson, loc. cit., 1944, p. 565, pl. 25, fig. 91) from California and Siam.

*Argulus capensis* n. sp.

Fig. 4

♀—Carapace subcircular, slightly longer than broad ( $4 \times 3.75$ ), front broad, lateral indents distinct but shallow, posterior lobes broadly rounded, reaching almost to base of abdomen. Eyes small. Anterior respiratory area wholly in front of the posterior area. Abdomen ovate, cleft nearly to midway, lobes ovate, bluntly pointed. Antenna 1 with small claw on anterior margin, strong apical claw and small projection near hind margin. Antenna 2 4-jointed sparsely setose, basal joint with rather strong spine. Supporting rods of sucker composed of 10-12 cups, the basal one slightly the longest. Basal joint of maxilliped with 3 strong spines, scabrous area pear-shaped. A pair of accessory spines between the bases of the maxillipeds, but no additional pair. No flagella on any of the legs.

6 mm. Whitish, the respiratory areas marked by dark interrupted line.

*Locality.* Zoetendals Vlei (Bredasdorp District), on the Cape Kurper (*Sandelia capensis*). (Transvaal Mus. 1 ♀ 1941.)

*Remarks.* This species is undoubtedly closely similar to *A. personatus* Cunn. 1913, from Lake Tanganyika. It differs in having no flagella on the legs, the basal joint of 4th leg (♀) not so strongly produced postero-laterally, and no additional pairs of spines behind the pair between the bases of the maxillipeds.

### Suborder CYCLOPOIDA

1913. Scott, T. & A., *Brit. Parasit. Copepoda*, i, p. 33.

1918. Sars, G. O., *Crust. Norw.*, vi, p. 1.

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 310 and 583 (key to genera).

Thorax (cephalothorax) usually more robust than, and sharply demarcated from, the narrow abdomen. Antenna 1 slender and elongate, or short and stout, those of ♂ alike on both sides, sometimes prehensile. Antenna 2 uniramous (some parasitic forms with rudimentary exopod), sometimes prehensile. Mouth-parts varying according to habits. First 4 pairs of legs well developed, but with exceptions in ♀ of some parasitic forms. Fifth pair of legs small, simple, alike in both sexes. Two lateral or subdorsal egg-sacs.

The group includes free-swimming, commensal, and parasitic forms, both marine and fresh water.

Sars includes *Sabelliphilus* in the family *Lichomolgidae*, and *Cancerilla* in the *Cancerillidae*. Dogiel compares *Entobius* with *Enterognathus* and *Mytilicola*.

*Key to South African genera*

1. Cephalothorax ovate, abdomen segmented.
  - a. Each ramus of first 4 pairs of legs 3-jointed. Antenna 2 with 3 (2) apical claws. On Polychaet worms. *Sabelliphilus*
  - b. Rami of legs unevenly jointed.
    - i. Rami of 2nd, 3rd, and 4th legs 3-jointed. Antenna 2 with 4 large apical claws. On fishes. *Ancistrotos*
    - ii. First 3 pairs of legs more or less reduced; 4th absent. Antenna 2 with one stout apical claw. On Brittle-stars. *Cancerilla*
2. Cephalothorax narrow elongate, abdomen unsegmented. Antenna 2 not prehensile, with apical spine-seta. On Polychaet worms. *Entobius*

Gen. *Sabelliphilus* M. Sars

1862. Sars, M., *Forh. Vidensk. Selsk. Christiania*, 1861, p. 139.

1918. Sars, G. O., loc. cit., p. 187.

1932. Wilson, loc. cit., p. 587 (in key).

Thorax in ♀ (typically) narrow ovate, abdomen slender. Antenna 1 7-jointed. Antenna 2 prehensile, uniramous, 4-jointed, 2nd joint with 6 stout teeth on inner surface, 3rd joint with curved claw, 4th joint subequal to or shorter than 3rd, with 3 claws (normally). Each ramus of first 4 legs 3-jointed. Fifth leg reduced to a single distinct joint with 2 setae.

Ectoparasitic on Sabellid Polychaet worms.

*Sabelliphilus* (?) *bispirae* M'Intosh

Fig. 5 a-c

1904. M'Intosh, *Mar. Invest. S. Afr.*, iii, p. 86, pl. 9.

Thorax ovate, not twice as long as wide, longer than abdomen, 1st segment (♀ ♂) and 2nd segment (♀) with angular, more or less projecting posterolateral corners. Abdomen narrow. Caudal rami narrow, 5 times as long as wide. Antenna 2 with only 2 apical claws.

♀ 1.2 mm., ♂ 0.7 mm.

*Locality.* Cape, on *Bispira volutacornis* (M'Intosh).

*Remarks.* M'Intosh notes that this species does not agree with *Sabelliphilus* in having only 2 apical claws on antenna 2, and in other details; and quotes Scott's opinion that it cannot be satisfactorily ascribed to any described genus.

In Wilson's key this species might be followed down to *Uperogcos*, but M'Intosh does not state the exact number of joints in antenna 2.

Gen. *Ancistrotos* Brian

1906. Brian, *Copep. Parasit. Pesci. Ital.*, p. 33.

1911. Wilson, *Proc. U.S. Nat. Mus.*, xxxix, pp. 384-6, and pp. 391, 392 (with key to species).

1924. id., *ibid.*, lxiv, Art. 17, p. 6.

1932. id., loc. cit., pp. 384, and (in key) 595.

1935. Leigh-Sharpe, *Parasitology*, xxvii, p. 266.

1939. id., *ibid.*, xxxi, p. 166.

1939. Yamaguti, *Parasit. Copep. Japan*, pt. 4, Cyclopoida 2 (Vol. Jub. Prof. Yoshida II), pp. 410-13.

Cephalothorax ovate, wider than the free segments. Abdomen 3 or 4 segmented. Antenna 1 6-jointed. Antenna 2 prehensile, with 4 apical claws. Each ramus of 1st leg consisting of a single widened joint; rami of 2nd-4th legs 3-jointed; 5th leg 1-jointed. Egg-sacs stout, moderately long.

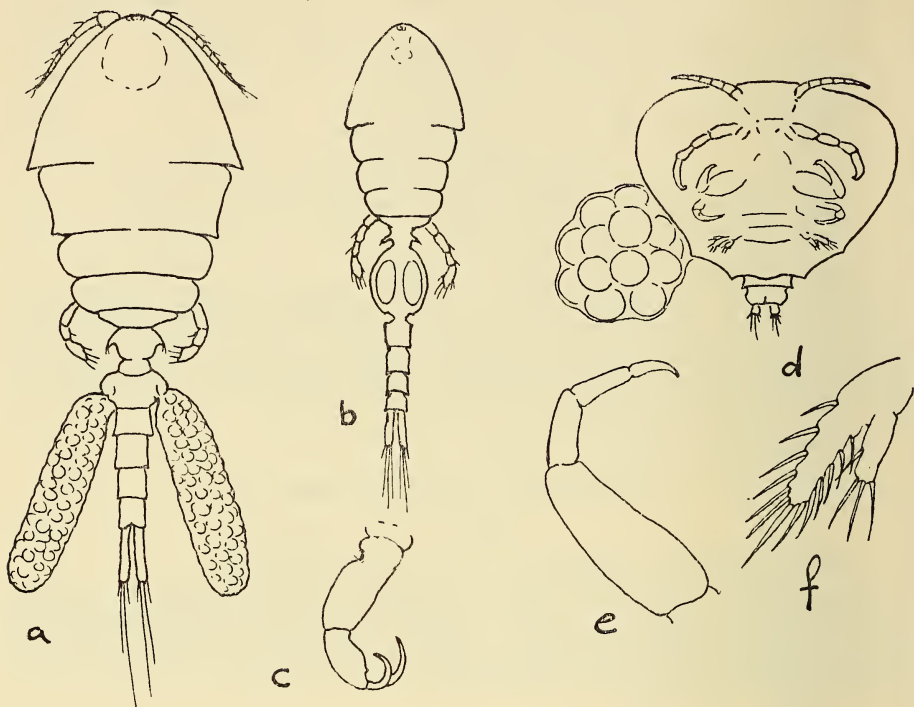


Fig. 5. *Sabelliphilus bispirae* M'Int. a, ♀; b, ♂; c, antenna 2 ♂. *Cancrerilla durbanensis* Steph. d, ventral view of *C. neozelanica* Steph. ♀; e, maxilliped; f, 2nd leg (copies: a-c, after M'Intosh; d-f, after Stephensen).

*Ancistrotos ostracionis* (Richiardi)

1870. Richiardi in Bianconi, *Spec. zool. Mosambicana*, fasc. xix/xx, p. 347. (*Bomolchus* [sic.] o, sine descr.).  
 1870. id., *Arch. Zool. Anat.*, (2) ii, p. (? 53, quotation from this page in Wilson, 1911). (*Bomolochus o.*)  
 1911. Wilson, loc. cit., pp. 385, and (in key) 392.

Abdomen 3-segmented, last segment longest. Terminal claw of maxilliped as long as basal joint, and without filaments. Both rami of 4th leg with plumose setae (Wilson, in key, 1911).

*Locality.* Mozambique, on *Ostracion cornutum* (Richiardi).

*Remarks.* Bianconi includes among the Zoophyta a brief note on the occurrence of Richiardi's species.

Gen. *Cancerilla* Dalyell

1851. Dalyell, *The Powers of the Creator*, i, p. 223.  
 1918. Sars, G. O., loc. cit., p. 138.  
 1927. Stephensen, *Vid. Medd. Dansk. Naturh. For.*, lxxxiii, p. 377.  
 1932. Wilson, loc. cit., p. 597 (in key).  
 1951. Heegaard, *Vid. Medd. Dansk. Naturh. For.*, cxiii, p. 172.

Thorax in ♀ very broadly ovoid, abdomen short, 3-segmented; in ♂ ovate, longer than broad, abdomen elongate, 5-segmented. Caudal rami smaller in ♀ than in ♂. Antenna 1 in ♀ short, 6-jointed, in ♂ longer, 10-jointed. Antenna 2 with stout apical claw. First 3 pairs of legs reduced in ♀, better developed in ♂; outer ramus of 3rd leg 1-jointed, inner ramus absent; 4th leg absent; 5th leg 1-jointed, with 2 setae in ♀, 5 in ♂.

*Cancerilla durbanensis* Steph.

Fig. 5 e, f.

1933. Stephensen, *Vid. Medd. Dansk. Naturh. For.*, xciii, p. 198, fig. 1.

♀—Thorax broadly cordate, widest near anterior end, front margin very slightly convex; genital segment very broad, nearly half as wide as thorax, 4 times as broad as long, lateral margin angulate. Second leg with both rami long, narrow, outer ramus with 6 setae on both inner and outer margins, inner ramus  $\frac{2}{3}$  length of outer, with 4 setae. Ovisacs globular. 1 mm.

*Locality.* Off Durban, 127-225 fathoms, on the cosmopolitan Brittle-star *Amphipholis squamata*.

*Remarks.* *C. tubulata* Dalyell and *C. neozelanica* Steph. occur on the same species of Ophiuran in Europe and New Zealand respectively. The South African and the New Zealand species agree in the shape of the thorax, and differ in this respect (as well as in minor details of the appendages) from the European species.

Gen. *Entobius* Dogiel

1908. Dogiel, *Zool. Anz.*, xxxiii, p. 561.  
 1932. Wilson, loc. cit., p. 592 (in key).

♀♂—Body narrow, with segmental constrictions but not truly segmented. Five thoracic segments. Abdomen unsegmented, ending in a pair of semi-articulated caudal styles. Antenna 1 3- or 4-jointed. Antenna 2 3-jointed, with terminal spine-seta, but not prehensile. Mandibles present. One pair of minute maxillae. Maxillipeds robust, prehensile, consisting of a basal joint and apical curved claw. Four pairs of biramous legs, rami of a single joint, setose on inner margin; 5th leg absent. Egg-sacs elongate, eggs multiseriate proximally, uniseriate distally.

Entoparasites on marine Polychaets. The type species was found in the intestine of a Terebellid (*Loimia*).

*Remarks.* Dogiel regards the segment behind that which carries the last pair of legs as the 5th thoracic segment, and the following segment as the 1st abdominal segment. The latter, however, carries the ovisacs and is clearly the genital segment of the thorax.

*Entobius euelpis* Brnrd.

Fig. 6 a.

1948. Barnard, *Ann. Mag. Nat. Hist.*, (xii), 1, p. 242, fig. 1.

♀—In general agreeing with *E. loimiae*. Antenna 1 3-jointed (not 4). Abdominal segment more flask-shaped, the caudal styles stouter and closer together (resembling a bifurcation); each style with a minute apical spine-seta but no subapical or marginal setae.

8 mm., breadth about 1 mm., ovisacs 6–7 mm.

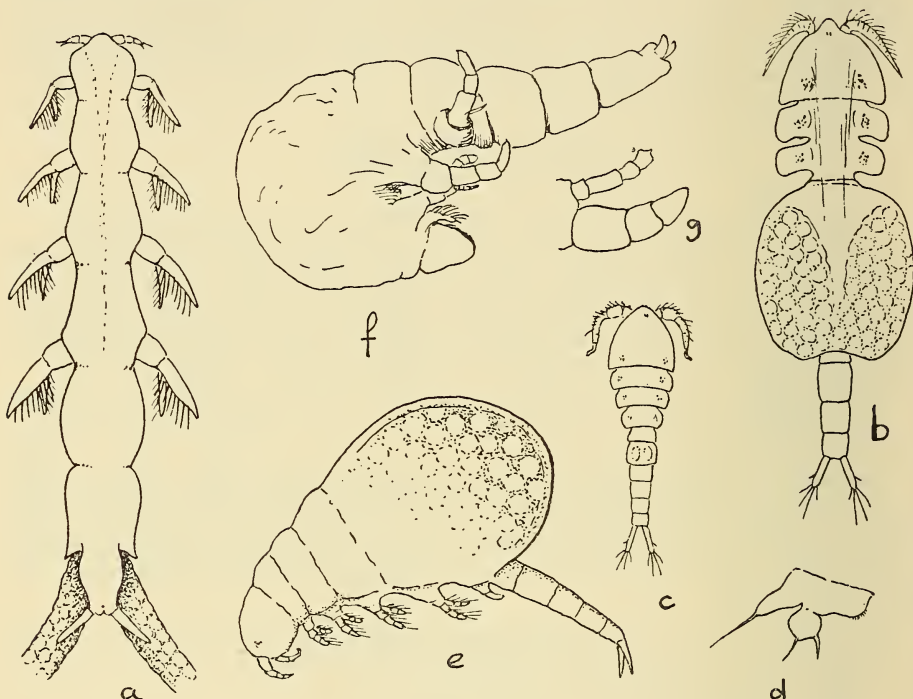


Fig. 6. *Entobius euelpis* Brnrd. a, ♀ (ovisacs not completely drawn). *Notodelphys allmani* Thorell. b, ♀; c, ♂; d, 5th leg. *Doropygus pulex* Thorell. e, ♀. *Gunenotophorus globularis* Costa. var. *giganteus* Schell. f, ♀; g, 2nd leg.

*Locality.* One ovigerous ♀ found in a bottle of slimy and much decomposed Polychaets in the s.s. *Pieter Faure* collection; uncertain whether from the Cape area or Natal.

## Suborder NOTODELPHYOIDA

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 385 and 598 (key to genera).

1948. Lang, *Ark. Zool.*, xl, 3, no. 14, pp. 1–36.

Ento- or ecto-parasites, or commensals; the majority living within Ascidiens. Females usually much modified and not leaving host after maturity, males retaining capacity for free-swimming.

Schellenberg (1922) adopts one family, but Sars (1921) and Wilson (1932) more than one. In these circumstances sharply defined family diagnoses are not advisable, and Schellenberg's scheme is adopted.

Fam. NOTODELPHYIDAE

1921. Sars, *Crust. Norw.*, viii, p. 29 (part, includes only 2 genera).  
 1921. Schellenberg, *K. Norsk. Vid. Selsk. Skr.*, no. 3, p. 3.  
 1922. id., *Mitt. Zool. Mus. Berlin*, x, p. 219 (key to genera).

*Key to South African genera* ♀♀

1. Ova contained in the swollen thoracic segments. Antenna 2 with apical claw. 5 pairs of legs in normal ventral position (*Notodelphyinae*).  
 a. Rami of 1st-4th legs setose.  
   i. 1st thoracic segment fused with head, 2nd and 3rd free. Brood pouch ovoid, dorso-ventrally flattened. Caudal rami with plumose apical setae. *Notodelphys*  
   ii. Head and 1st three thoracic segments distinct. Brood pouch dorsally gibbous. Caudal rami with minute apical setules. *Doropygus*  
 b. Rami of 1st-4th legs non-setose. Head distinct, thoracic segments much swollen. Caudal rami non-setose. *Gunenotophorus*
2. Ova contained in external ovisacs. Antenna 2 without apical claw (S. African genera). 5th legs more or less dorso-lateral in position (*Ascidicolinae*)  
 a. 5th legs digitiform. *Botryllophilus*  
 b. 5th legs lamelliform.  
   i. Exopods of 1st-4th legs spiniform. *Enterocola*  
   ii. Exopods of 1st-4th legs falciform *Zanclopus*

Gen. *Notodelphys* Allman

1847. Allman, *Ann. Mag. Nat. Hist.* (1), xx, p. 2.  
 1878. Brady, *Brit. Copep.* (*Ray Soc.*), i, p. 125.  
 1921. Sars, loc. cit., p. 30.  
 1922. Schellenberg, loc. cit., p. 225 (key to species).  
 1932. Wilson, loc. cit., p. 386.  
 1948. Lang, loc. cit., p. 4.

♀—1st thoracic segment usually fused with head, 2nd and 3rd free, separated by deep lateral incisions. Brood pouch arising from 4th segment, ovoid, dorso-ventrally somewhat flattened. Caudal rami each with 4 plumose setae and a spine on outer margin. Antenna 1 15-jointed. Antenna 2 3-jointed. 1st-4th pairs of legs biramous, both rami 3-jointed; 5th pair very small, basal joint produced externally into a digitiform process tipped with a long spine, ramus ovoid, with a spine and a seta.

♂—All segments, except 1st thoracic, free. 1st abdominal segment slightly swollen, with (when mature) 2 spermatophores.

Antenna 1 11- or 12-jointed, last 2 joints bent, feebly prehensile.

*Remarks.* Several species have been described, but they are not easily separable. The position of the spine on outer margin of caudal rami has been used, but Schellenberg thinks the 5th pair of legs may be a better differential character (cf. figures of 7 species in Sars).

*Key to South African species*

1. ♀ 1st thoracic segment fused with head. ♂ cephalic segment longer than wide, postero-lateral corners not elongated. *allmani*

2. ♀ 1st thoracic segment free. ♂ cephalic segment as wide as long, postero-lateral corners elongated.

*weberi**Notodelphys allmani* Thorell

Fig. 6 b-d.

1860. Thorell, *K. Sv. Vet. Akad. Handl.*, iii, p. 31, pl. 1, pl. 2, fig.  
 1869. Buchholz, *Z. wiss. Zool.*, xix, p. 111, figs. (*mediterranea*).  
 1878. Brady, loc. cit., p. 126, pl. 25, figs. 1-10.  
 1921. Sars, loc. cit., p. 31, pls. 15, 16.  
 1922. Schellenberg, loc. cit., p. 227 (in key), and p. 262 (locality record).

♀—1st thoracic segment fused with head. Last abdominal segment quadrangular. Spine on outer margin of caudal ramus at about  $\frac{3}{4}$  length of ramus. 5th leg see fig. 6d.

♀ 4.5 mm., ♂ 1.9 mm. Pale yellowish, eggs greenish.

*Localities.* Simons Bay, in *Ascidia sydneyensis* (Schellenberg); Still Bay, in Ascidians, coll. T. A. Stephenson. 4 ovig. ♀♀ (S. Afr. Mus.); mouth of Zwartkops River estuary, Port Elizabeth, in Ascidians (W. Macnae, Rhodes University, ovig. ♀♀, ♂♂).

*Distribution.* West coast of Europe, Mediterranean.

*Remarks.* Some of the specimens I have seen resemble closely Stock's figure of the ♀ *weberi* as regards the *outline* of the hind part of head with the 1st thoracic segment; but the latter is certainly not a free segment.

*Notodelphys weberi* Stock

1950. Stock, *Amsterdam Nat.*, I, 2, pp. 37-42, figs. 1-3. (♀ ♂).  
 See key above. ♀ 4.2 mm., ♂ 2.2 mm. Yellowish-grey.

*Locality.* Knysna, in *Ascidia canaliculata* (Stock).

Gen. *Dorophygus* Thorell

1859. Thorell, *Ofvers. Vet. Akad. Forh.*, xvi, p. 339 (part).  
 1860. id., *K. Sv. Vet. Ak. Handl.*, n.f., iii, no. 8, p. 46.  
 1921. Sars, loc. cit., p. 42.  
 1922. Schellenberg, loc. cit., p. 238 (key to species).  
 1932. Wilson, loc. cit., p. 387.  
 1948. Lang, loc. cit., p. 6.

♀—Body somewhat laterally compressed and curved ventrally. Head and first 3 thoracic segments distinct; 4th and 5th segments fused and overlaid by the large gibbous brood pouch. Caudal rami elongate, sometimes coiled distally, apical setae not plumose, usually minute. Antenna 1 usually 9-, sometimes 10- or 13-jointed; first 2 joints enlarged. Antenna 2 2- or 3-jointed. 1st-4th pairs of legs basally stout and muscular, biramous, rami 3-jointed, or endopods of 2nd-4th pairs 2-jointed; 5th pair with a single one-jointed ramus (sometimes biramous).

♂—Body cylindrical, tapering. All thoracic segments free.

*Dorophygus pulex* Thorell

Fig. 6 e.

1860. Thorell, loc. cit., p. 46, pl. 6.  
 1878. Brady, loc. cit., p. 133, pl. 28, figs. 1-12.



1921. Sars, loc. cit., p. 42, pl. 20.

1922. Schellenberg, loc. cit., pp. 241 (in key), 246, 271, 272, figs. 26, 27.

1932. Wilson, loc. cit., p. 389, fig. 239.

Last abdominal segment cleft (♀ ♂). Caudal rami not apically coiled, apical setae minute. 5th leg uniramous. Apical claw of antenna 2 as long as 2nd joint.

♀ 3.8 mm., ♂ 1.5 mm.

*Localities.* Lüderitzbucht, in *Pyura stolonifera* ('Red Bait') (Schellenberg); St. James, False Bay, in *Pyura stolonifera*, coll. K.H.B. 1913 (S. Afr. Mus.); Kleinmond, Cape, in Ascidian (Univ. Cape Town Ecolog. Surv. 1939); mouth of Zwartkops River estuary, Port Elizabeth, in Ascidians (W. Macnae, Rhodes University, ovig. ♀♀); Durban, in *Microcosmus oligophyllus* var. *wahlbergi* (Schellenberg).

*Distribution.* Europe, Mediterranean, east coast of N. America, Barbados, West Africa, Australia, Japan.

#### Gen. *Gunentophorus* Costa

1840. Costa, *Fauna Regn. Nap. Cat. Crost.*, p. 7.

1864. Claus, *Z. wiss. Zool.*, xiv, p. 379 (*Sphaeronotus*, non Laporte 1832).

1869. Buchholz, *ibid.*, xix, p. 144 (*Gunentophorus*).

1879. Kerschner, *Denkschr. Ak. Wiss. Wien.*, xli, p. 156 (*Gunentophorus*).

1905. Norman, *Mus. Norman.*, ed. 2, no. 3, p. 36 (*Gunentrophus*).

1910. Stebbing, *Gen. Cat. S. Afr. Crust.*, p. 550.

1921. Sars, loc. cit., p. 56 (*Gunentophorus*).

1922. Schellenberg, *Mitt. Zool. Mus. Berlin*, x, p. 257.

1932. Wilson, loc. cit., p. 602 (in key) (*Gunentophorus*).

♀—Thorax greatly inflated, segments more or less confluent, at least dorsally in ovigerous individuals. Head bent ventrally. Abdomen straight, only 3 segments distinct. Antenna 1 short, compressed, joints ill-defined. Antenna 2 3-jointed, with apical claw. Mandibles well developed. One pair of maxillae, 2 pairs of maxillipeds. 1st-4th pairs of legs biramous, outer rami 3-jointed, inner ramus of 1st pair 3-jointed, of 2nd and 3rd pairs 4-jointed, of 4th 2-jointed; only the 1st pair setose, closely applied to the mouth-parts, inner rami of 2nd-4th pairs small and weak; 5th pair absent. Caudal rami curved outwards, 1-jointed, with minute apical setules. No external ovisacs. Male unknown. In Ascidians.

*Remarks.* I have not seen Kerschner's reasons for the change in spelling. There is not a great difference in the meaning of the two compound words. But if Stebbing's statement (p. 550) is correct, viz. that Costa gave no definition of the genus or the species, then maybe Costa's name is a *nomen nudem* and Kerschner's name should be adopted. There is no justification for Norman's suggested name. Stebbing also points out that Costa's specific name may have to be replaced by *thorelli* Claus 1864.

One other species: *spinipes* Schell. 1922, in S. America.

#### *Gunentophorus globularis* Costa

Fig. 6 f, g.

1840. Costa, loc. cit., p. 7.

1864. Claus, loc. cit., p. 379 (*Sphaeronotus thorelli*).

1910. Stebbing, loc. cit., p. 550.

1921. Sars, loc. cit., p. 57, pl. 28, fig. 2.

1922. Schellenberg, loc. cit., p. 258, fig. 38 (prp. 2), and var. *giganteus* p. 258, fig. 39 (prp. 2), and pp. 268, 271.

Third joint of outer ramus of 2nd leg without spines.

Up to 6.5 mm., var. *giganteus* up to 8.4 mm.

*Localities.* Var. *giganteus*: False Bay, in *Pyura stolonifera* ('Red Bait') (Stebbing, and S. Afr. Mus.); Lüderitzbucht, Simons Bay, and Plettenberg Bay (Schellenberg); Groen River, south of Hondeklip Bay (west coast), in *Pyura stolonifera* (Univ. Cape Town Ecol. Surv. 1939).

*Distribution.* Mediterranean and coasts of France and Scandinavia.

*Remarks.* The variety differs from the typical form in having the outer ramus of 2nd leg stout and very little longer than inner ramus, instead of slender and nearly twice as long. All the South African specimens which I have seen, including Stebbing's material, belong to the variety.

#### Gen. *Botryllophilus* Hesse

1864. Hesse, *Ann. Sci. Nat.*, ser. 5, i, p. 345.

1921. Sars, loc. cit., p. 67.

1922. Schellenberg, loc. cit., pp. 281, 296.

1932. Wilson, loc. cit., p. 392.

1948. Lang, loc. cit., pp. 8, 14.

♀—Head distinct. The 5 thoracic segments more or less completely fused, often swollen in adult. Abdomen 4-8-segmented. Caudal rami prehensile, each with 4 stout curved spines. Antenna 1 short, basal joint broad, other joints reduced. Antenna 2 with 2nd joint short, 3rd with strong spines. Maxilliped very stout, conical, 3-jointed, with apical claw. 1st-4th legs biramous, rami 1- or 2-jointed, outer rami sometimes symmetrical; 5th legs unjointed, digitiform, supporting on either side the round ovisacs.

♂—Cycloform. Abdomen 6-8-jointed. Genital segment broad.

Schellenberg (p. 285) has discussed the asymmetry of the legs in the ♀. Inhabits the gill-sac and cloaca of Ascidians.

#### *Key to the South African species*

1. Outer rami of 1st-4th legs asymmetrical.

*africanus*

2. Outer rami approximately symmetrical.

*aspinosus*

Schellenberg (p. 294) also records a species of this genus in *Polycitor renieri* from Plettenberg Bay.

#### *Botryllophilus africanus* Schell.

1922. Schellenberg, loc. cit., p. 284, figs. 3 a-d.

Length ♀ 1.2 mm.

*Locality.* Angola, in *Macroclinum angolatum* (Schellenberg).

#### *Botryllophilus aspinosus* Schell.

Fig. 7 a.

1922. Schellenberg, loc. cit., p. 283, figs. 1, 2 a-c.

Length ♀ 2 mm.

*Locality.* Angola, in *Styela hupferi* (Schellenberg).

*Distribution.* Plymouth, England.

Gen. *Enterocola* van Bened.

1860. Van Beneden, *Bull. Ac. Belg.*, ser. 2, ix, p. 154.

1909. Chatton & Brément, *Bull. Soc. zool. Fr.*, xxxiv, p. 223 (references).

1921. Sars, loc. cit., p. 76.

1922. Schellenberg, loc. cit., p. 287.

♀—Head distinct. Thorax cylindrical, 4-5 segmented. Abdomen short, conical, more or less distinctly segmented. Caudal rami lamellate or digitiform. Antenna 1 short. Antenna 2 1-2-jointed, lamellate. Mandibles absent.

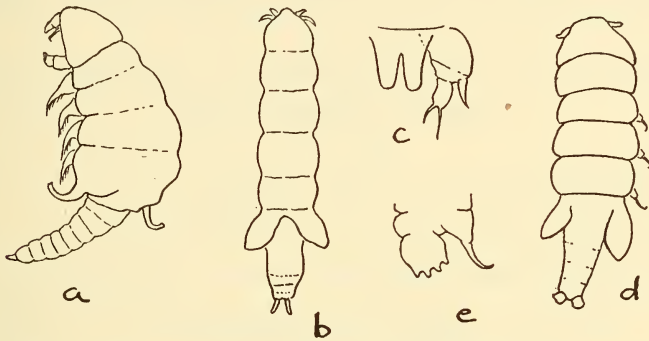


Fig. 7. *Botryllophilus aspinosus* Schell. a, ♀, *Enterocola bilamellatus* Sars. b, ♀; c, 2nd leg, with median lamina. *Zanclopus cephalodisci* Calman. d, ♀; e, 4th leg (copies: a, after Schellenberg; b, c, after Sars; d, e, after Calman).

1st-4th pairs of legs united by a median projecting lamina, flattened, biramous, both rami 1-jointed, outer rami spiniform, inner rami with 2 spine-setae; 5th legs broadly lamellate, acting as ovitectorices.

♂—Cyclopiform. Abdomen 5-segmented. Antenna 1 8-jointed. Antenna 2 3-jointed, with apical claw. 1st-4th legs natatory, biramous, both rami usually 3-jointed.

Only found in compound Ascidians (*Krikobranchiata*).

*Enterocola fulgens* van Bened.

1860. Van Beneden, loc. cit.

1909. Chatton & Brément, loc. cit., p. 227.

1922. Schellenberg, loc. cit., p. 287.

♀—Thorax without alate expansions (except the modified 5th pair of legs). Caudal rami  $1\frac{1}{2}$ -2 times as long as wide. 1.5 mm.

*Locality.* Table Bay, in *Amaroucium erythraeum* (Schellenberg).

*Distribution.* Europe, Mediterranean.

*Remarks.* In fig. 7 is given an illustration of an allied species, *E. bilamellatus* Sars 1921, as an example of the genus.

Gen. *Zanclopus* Calman

1908. Calman, *Mar. Invest. S. Afr.*, v (*Tr. S. Afr. Phil. Soc.*, xvii), p. 178.  
 1913. Gravier, *Deux. Exp. antarct. Franç.*, p. 68.  
 1922. Schellenberg, loc. cit., p. 295 (in list of genera, etc.).  
 1932. Wilson, loc. cit., p. 601 (in key to genera).

♀—Head distinct. Thorax cylindrical, 5-segmented. Abdomen obscurely segmented. Caudal rami short, with 4 short spiniform points directed outwards. Antenna 1 short but conspicuous, 1-jointed. Antenna 2 smaller than antenna 1. 1st-4th pairs of legs biramous, outer ramus ending in a sickle-shaped claw, inner ramus subcircular with 4 marginal papillae; 5th legs large, ovate.

♂—Cycloform. Abdomen 5-segmented. Antenna 1 (in adult) 7-jointed. Antenna 2 3-jointed, with 2 or 3 apical claws. 1st-4th pairs of legs natatory, biramous, rami 3-jointed; 5th leg consisting of 2 small papillae, each bearing a seta.

In the stomachs of the zooids of *Cephalodiscus* (*Pterobranchiata*).

*Zanclopus cephalodisci* Calman

Fig. 7 d, e.

1908. Calman, loc. cit., p. 178, pls. 18, 19.  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 550.

Length ♀ 0.62 mm., ♂ 0.6 mm.

*Locality.* Agulhas Bank in *Cephalodiscus gilchristi* (Calman).

## Suborder CALIGOIDA

1913. Scott, T. & A., *Brit. Parasit. Copepoda*, i, p. 43.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 397 and 604 (key to genera).

Body segmented or not. Fourth thoracic segment usually movably articulated with 3rd segment, but firmly attached to 5th. In some fixed parasites the movable articulation is lost in the ♀, the whole body becoming rigid. First, or 1st and 2nd, or 1st to 3rd thoracic segments often fused with head, forming a shield-like carapace. Antenna 1 reduced to 1 or 2 joints. Antenna 2 prehensile. A sternal fork (furca) sometimes present between bases of maxillipeds. Usually 4 pairs of legs, but one or two pairs may be wanting. Fifth pair rudimentary or obsolete. Two lateral ovisacs, usually filiform or cylindrical, uniseriate.

Parasitic on aquatic mammals and fishes, rarely on Invertebrates; mostly retaining the power of swimming and sometimes (especially males) captured in plankton.

*Remarks.* Scott excludes the family *Lernaeidae* from the *Caligoida*, including it with the *Chondracanthidae* and *Lernaeopodidae* in a suborder (tribe) *Lernaeoidea*. Wilson, however, includes the *Lernaeidae* in the *Caligoida*, and the *Chondracanthidae* and *Lernaeopodidae* in the suborder *Lernaeopodoida*, not recognizing *Lernaeoidea*.

The sternal fork (intercoxal plate: Lang, 1951, *Ark. Zool.*, 2nd ser., I, 6, p. 499) is not found in all *Caligoida*, but it is not found in any other suborders.

Wilson's families are here adopted, but without family diagnoses. The key to the South African genera utilizes some of the characters in Wilson's key, but it is admittedly unsatisfactory.

*Dysgamus* St. & Lütke., 1861 occurs on the Whale Shark (*Rhynchodon typicus*) (Wilson, 1944, *Proc. U.S. Nat. Mus.*, xciv, pp. 531, 533), a shark which is known to occur in South African waters. Heegaard (1943, *Ark. Zool.*, xxxiv, 4, A. 18, p. 24, figs. 65-75) records specimens from a 'Cape-line ship' which he would have considered to be the free-swimming stage of some Caligid, had not Bassett-Smith (1899, *Proc. Zool. Soc. Lond.*, p. 460) recorded ovigerous ♀♀. Wilson (1907, *Proc. U.S. Nat. Mus.*, xxxi, p. 712) accepted the genus provisionally pending the discovery of the ovigerous ♀.

*Key to the South African genera (♀♀ only)*

- I. A shield-like cephalothorax. Body more or less depressed.
- A. Head and first 3 thoracic segments fused, 4th segment free.
1. 4th segment without dorsal plates.
- a. With frontal lunules. *Caligus*
- b. Without frontal lunules.
- i. 4th leg uniramous. *Lepeophtheirus*
- ii. 4th leg biramous. [*Dysgamus*]
2. 4th segment with a pair of dorsal plates. *Alebian*
- B. Head and first 2 thoracic segments fused, 3rd and 4th free, without dorsal plates. *Trebius*
- C. Head and first thoracic segment fused, 2nd-4th free (2nd and 3rd sometimes fused); one or more segments with dorsal plates.
1. 3 pairs of dorsal plates (segments 2-4).
- a. A 6th thoracic segment concealing the abdomen. *Pandarus*
- b. No 6th segment. *Perissopus*
2. 2 pairs of dorsal plates (fused 2-3, and 4).
- a. Ovisacs visible, elongate. *Achtheimus*
- b. Ovisacs concealed, coiled. *Cecrops*
3. One pair of dorsal plates (segment 4).
- a. Legs not foliaceous.
- i. Ovisacs visible.
- a. Plates of 4th segment and those of 5th with smooth margins.
- \* 2nd and 3rd segments not fused.
- † A 6th thoracic segment with a pair of small dorsal plates. *Dinemoura*
- †† No 6th thoracic segment. *Echthrogaleus*
- \*\* 2nd and 3rd segments fused, with lateral lobes. *Nesippus*
- β. Plates of 4th segment and those of 5th with serrated margins. *Philorthagoriscus*
- ii. Ovisacs concealed. *Orthagoriscicola*
- b. Legs foliaceous, forming with the dorsal plates of 4th segment a skirt surrounding the genital segment and abdomen. *Anthosoma*
4. 2nd-4th segments fused, with a single dorsal plate covering genital segment and abdomen. *Lernanthropus*
- II. Body without shield-like carapace, more or less segmented and cylindrical.
- a. Head without horns or processes for attachment.
- A. Body distinctly segmented. 4 pairs of biramous legs. *Nemesis*
- B. Body divided into head, neck, and unsegmented trunk. 2 pairs of biramous legs. *Hatschekia*

III. Body without carapace, cylindrical but not segmented. Head and neck distinct; head with horns or processes for attachment.

- A. Abdomen without processes.  
 1. Head with horn-like processes.  
 2. Head with branched processes.  
 B. Abdomen with plumose processes.

*Lernaea*  
*Cardiodectes*  
*Pennella*

#### Fam. CALIGIDAE

1905. Wilson, *Proc. U.S. Nat. Mus.*, xxviii, p. 532 (*Caliginae*).  
 1934. Gurney, *Proc. Zool. Soc. Lond.*, 1934, 2, pp. 177 sqq., figs. (development).

#### Gen. *Caligus* Müller

1785. Müller, O. F., *Entomostraca*, p. 128.  
 1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 446 (list of species).  
 1905. Wilson, loc. cit., p. 555 (key to species).  
 1908. id., *ibid.*, xxxiii, pp. 594 sqq.  
 1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 44.  
 1924. Brian, 'Parasit. Mauritan.' (*Bull. Com. Etud. Hist. Sci. Afr. occid. Fr.*), fasc. 1, pp. 13 sqq.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 397, and 605 (in key).  
 1935. Brian, *Ann. Mus. Civ. Genoa*, lvii, p. 152 (Mediterranean species).  
 1936. Yamaguti, *Parasit. Copep. Japan*, pt. 2, *Caligoida* 1, pp. 2-9.  
 1937. Wilson, *Hancock Pacific Exp.*, II, 4, p. 24.  
 1939. Yamaguti, *Parasit. Copep. Japan*, pt. 5, *Caligoida* 3 (*vol. Jubil. Prof. Yoshida*, II), pp. 445-9.  
 1951. Pearse, *Proc. U.S. Nat. Mus.*, ci, p. 344.  
 1954. Yamaguti, *Publ. Seto Mar. Biol. Lab.* III, 3, pp. 379 sqq.

Carapace large, oval or subcircular. Genital segment simple, without plates or processes. Abdomen 1-4-segmented; caudal rami usually moderate or small. Frontal lunules present. Maxilla 2 simple, spiniform. Sternal fork present. 1st and 4th legs uniramous, 2nd and 3rd biramous; 4th leg 3-jointed, rarely 4-jointed. Rudiments of 5th and 6th legs sometimes present. Ovisacs elongate, uniseriate.

On a variety of hosts, mostly Teleost fishes.

#### Key to South African species

- I. 4th leg 4-jointed.  
 A. 1st abdominal segment 4 times the length of 2nd. *pelamydis*  
 B. 1st abdominal segment shorter than 2nd. [*elongatus*]
- II. 4th leg 3-jointed.  
 A. Abdomen ♀ 4, ♂ 2-segmented. *coryphaenae*  
 B. Abdomen 1-segmented, or more or less distinctly 2-segmented.  
 1. Abdomen long, in ♀ about as long as, in ♂ longer than, genital segment.  
 a. Caudal rami long, in ♀ about half length of, in ♂ longer than abdomen. *lalandei*  
 b. Caudal rami short.  
 i. Caudal rami short. Abdomen distinctly 2-segmented, a little shorter than genital segment. *cossackii*  
 ii. Caudal rami very short. Abdomen 1-segmented, a little longer than genital segment. *arii*

2. Abdomen short, about half length, or less, of genital segment.

a. Caudal rami much longer than wide.

b. Caudal rami about as broad as long.

*engraulidis*  
*tetrodontis*

*C. elongatus* Heegaard (1943, *Ark. Zool.*, xxxiv, 4, A. 18, p. 11, figs. 21-31) was described from specimens from a 'Cape-line ship', but not necessarily from South African waters. No host was recorded.

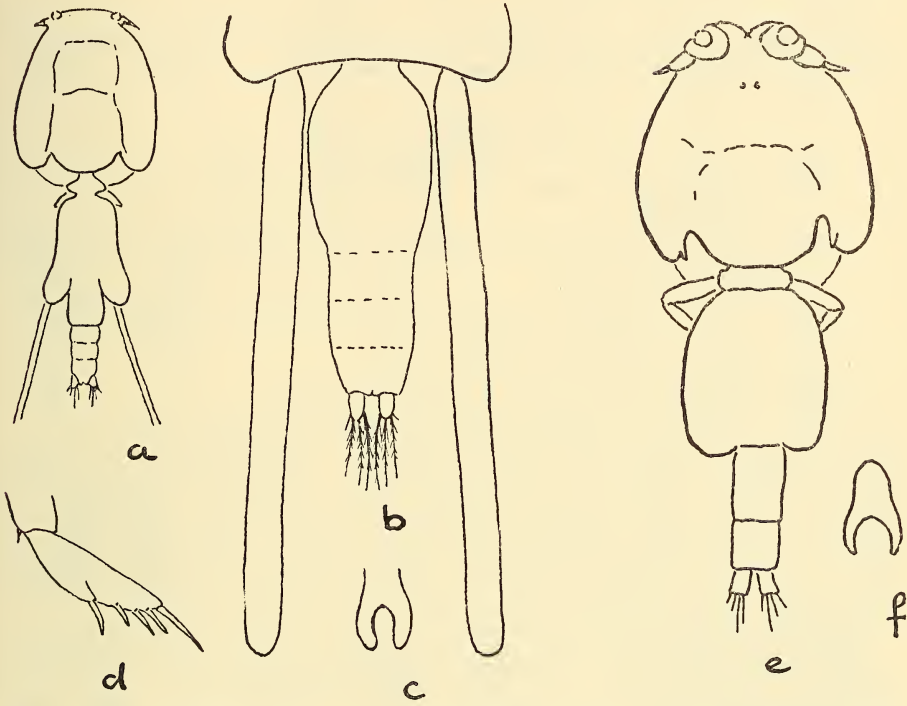


Fig. 8. *Caligus coryphaenae* St. & L. a, ♀; b, abdomen ♀; c, furca; d, 4th leg. *Caligus cossackii* B-S. e, ♀; f, furca (copies: a, from Brian, after St. & L.; b-d, after Brian; e-f, after Heegaard).

#### *Caligus pelamydis* Kröyer

1863. Kröyer, *Naturh. Tidsskr.*, ser. 3, ii, p. 124 (*vide* Stebbing), p. 50 (*vide* Wilson), pl. 4, figs. 4 a-g.  
 1905. Wilson, loc. cit., p. 594, pl. 13, figs. 154-61, pl. 14, fig. 161 a.  
 1910. Brady, *Deutsch Südpol. Exp.*, xi (zool. iii), p. 589, fig. 69 (♀).  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.  
 1913. Scott, T. & A., loc. cit., p. 57, pl. 7, figs. 2, 3 (♀), pl. 9, figs. 1-5 (♀), pl. 71, fig. 14 (♂).  
 1932. Wilson, loc. cit., p. 406, fig. 254.  
 1935. Brian, loc. cit., p. 183, figs. xii (after Wilson) and xiii.

♀—Carapace oval, less than half total length. 4th segment narrow, short. Genital segment a little longer than wide, oblong, narrowing anteriorly, truncate posteriorly. Abdomen as long as carapace, and slightly longer than

genital segment, obscurely 2-segmented, 1st segment nearly 4 times length of 2nd; caudal rami shorter than 2nd segment, with plumose setae. Furca with base much narrower than width across prongs, these short, broad, curved. 4th leg 4-jointed, last 3 joints with 1, 1, and 3 spines respectively, these 5 spines set closely together like a comb. Ovisacs rather stout, as long as carapace plus genital segment, about 30 eggs in each.

3.3 mm. Yellowish-white.

*Locality.* Simons Bay (Brady).

*Distribution.* Danish and British seas, Mediterranean, east coast of N. America. On *Pelamys sarda* and *Gymnosarda pelamys*.

*Caligus coryphaenae* St. & L.

Fig. 8 a-d.

1861. Steenstrup & Lütken, *K. Dansk. Videns. Sels. Skr.* (5), v, p. 360, pl. 4, fig. 7.  
 1894. Scott, *Trans. Linn. Soc. Lond.* (2), vi, p. 130, pl. 14, fig. 20 (*bengoensis*) (juv. ♂).  
 1905. Wilson, loc. cit., p. 555 (*bengoensis*), and pp. 556, 559 (in key).  
 1923. id., *Ark. Zool.*, xv, 3, p. 5.  
 1935. Brian, loc. cit., p. 202, figs. xix, xx.  
 1936. Yamaguti, loc. cit., p. 5, pl. 4, figs. 40-54.  
 1949. Heegaard, *Vid. Medd. Dansk. nat. For.*, cxi, p. 240, figs. 6-10.

♀—Carapace oval, less than half total length. Genital segment longer than wide, somewhat wider posteriorly (deeply lobed: Steenstrup & Lütken; not so deeply: Brian's and Yamaguti's figures). Abdomen about as long as genital segment, 4-segmented (junctions somewhat obscure: Brian's figures), 1st segment as long as the others together; caudal rami short, with plumose setae. Furca narrow, with narrow prongs. 4th leg 3-jointed, 1 apical spine on 2nd joint, 4 spines on 3rd (Brian, Yamaguti). Ovisacs slender, elongate.

♂—Carapace oval, more than half total length. Genital segment quadrate. Abdomen a little shorter than genital segment, 2-segmented; caudal rami short (Steenstrup & Lütken's figures in Brian). Rudiments of 5th leg visible. Length: ♀ 6-7 mm., ♂ 2-3 mm.

*Locality.* Delagoa Bay, on *Squalus acanthias* (Wilson).

*Distribution.* Atlantic and Mediterranean, on *Coryphaena hippurus*; Loanda; Pacific.

*Caligus lalandei* Brnrd.

Fig. 9 a-c.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 243, fig. 2.

♀—Carapace oval, less than half total length. 4th segment not laterally prominent. Genital segment oval, longer than wide, posterior corners rounded, slightly produced. Abdomen nearly as long as genital segment, obscurely 2-segmented, 1st segment slightly narrower than 2nd which is about  $2\frac{1}{2}$  times as long as 1st, straight-sided; caudal rami about  $\frac{2}{3}$  length of abdomen, elongate-lanceolate, apical setae short, nonplumose. Furca widening distally, with oval sinus between broad apically truncate prongs. 4th leg 3-jointed, one spine on apex of 2nd joint, apex of 3rd joint with 1 long and 2 short spines each with serrated scale at base. Ovisacs about  $\frac{2}{3}$  total length.



♂—Genital segment quadrate, longer than wide, hind corners quadrate. Abdomen about twice as long as genital segment, obscurely 2-segmented, 2nd segment about  $2\frac{1}{2}$  times as long as 1st, sides gently converging; caudal rami very elongate, about  $\frac{2}{3}$  total length, filiform, with 2 long and 1 short apical spine-setae, nonplumose.

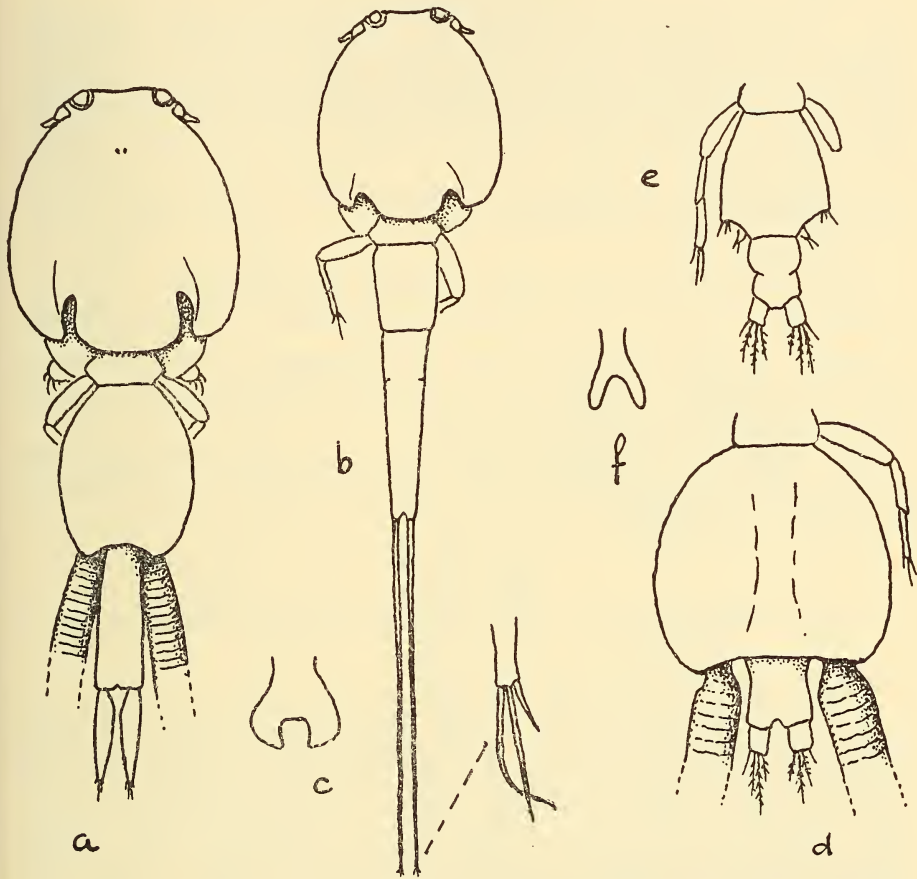


Fig. 9. *Caligus lalandei* Brnrd. a, ♀; b, ♂; c, furca. *Caligus tetradontis* Brnrd. d, genital segment and abdomen ♀; e, genital segment and abdomen ♂; f, furca.

♀ 10.5 mm. (9 mm. to end of abdomen); ♂ 16 mm. (9 mm. to end of abdomen), carapace 4 mm., abdomen 3 mm., caudal rami 7 mm.

*Locality.* Kalk Bay (Cape Peninsula), on Yellow-tail (*Seriola lalandei*), 4 ♀♀, 1 ♂, C. L. Biden.

*Remarks.* Noteworthy on account of the length of the caudal rami in both sexes, but especially in the ♂. The ♀ differs from that of *seriolae* Yamaguti 1936 in the shape of the furca and the considerably longer caudal rami: the ♂ of *seriolae* is unknown.

*Caligus cossackii* B-S.

Fig. 8 e, f.

1898. Bassett-Smith, *Ann. Mag. Nat. Hist.* (vii), 2, p. 85, pl. 4, figs. 3, 3 a-f (♀).

1943. Heegaard, *Ark. Zool.*, xxxiv, A, 18, p. 5, fig. 12 A-C (♀).

♀—Carapace subcircular, shorter than half total length, frontal plate concave. 4th segment not laterally prominent. Genital segment longer than broad, oblong, without 'neck', hind corners rounded, without processes or rudiments of 5th legs. Abdomen distinctly 2-segmented, 2nd segment a little shorter than 1st; caudal rami short, well developed. Lunules very prominent. Furca with divergent prongs, slightly incurved apically. 4th leg 3-jointed. Ovisacs moderately stout.

♂—More elongate. Genital segment oval. Caudal rami longer and more profusely setose (Bassett-Smith).

♀ 5 mm., ♂ 3 mm.

*Locality.* Madagascar, in gill cavity of *Sparus berda* (Heegaard).

*Distribution.* Persian Gulf and Ceylon, on *Chrysophrys sarba* (Bassett-Smith).

*Remarks.* As both *Acanthopagrus berda* and *Austrosparus sarba* are found in South African waters, it is reasonable to expect that this parasite will eventually be included in the South African fauna-list.

There seems to be a strong similarity between this species and *affinis* Heller (see figure in Brian, *Rev. Zool. Bot. Afric.*, xxxii, p. 178, fig. 1, 1939. Mouth of Congo River, on *Sphyaena*).

*Caligus arii* B-S.

Fig. 10 a, b.

1898. Bassett-Smith, *Ann. Mag. Nat. Hist.* (vii), 2, p. 82, pl. 4, figs. 1, 1 a-d (♀).

1948. Barnard, *ibid.* (xii), 1, p. 244.

♀—Carapace subcircular, considerably shorter than half total length. 4th segment not laterally prominent. Genital segment slightly longer than broad, oblong, with a 'neck' anteriorly of about the same width as 4th segment, hind corners rounded, slightly produced, without processes or rudiments of 5th legs. Abdomen 1-segmented (Bassett-Smith: 2-segmented, 2nd segment short, as long as wide), as long as genital segment (without the 'neck'), slightly tapering; caudal rami distinct, well developed, but very short. Lunules very prominent. Furca with moderately divergent prongs, slightly incurved apically. 4th leg 3-jointed. Ovisacs stout, not very much longer than abdomen.

4.5 mm.

*Locality.* Chinde, mouth of Zambezi River, on palate of *Arius dussumieri*, 3 ♀♀, K.H.B. 1912.

*Distribution.* Ceylon, on *Arius acutirostris*.

*Remarks.* There is little doubt that these specimens should be regarded as conspecific with the Ceylon specimens in spite of certain differences. The abdomen shows no trace of a division into two segments near the hind end, and the caudal rami are quite well developed although small. The 4th leg is composed (as usual) of 3 joints, there being no trace of a division near the apex

(as shown in Bassett-Smith's figure). These differences may be due to the hosts being different species, though of the same genus, but they scarcely warrant the institution of a separate species.

*Caligus engraulidis* Brnrd.

Fig. 10 *c, d*.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 244, fig. 3.

♀—Carapace oval, longer than rest of body. 4th segment small, not laterally prominent. Genital segment wider than long, subquadrangular, hind corners

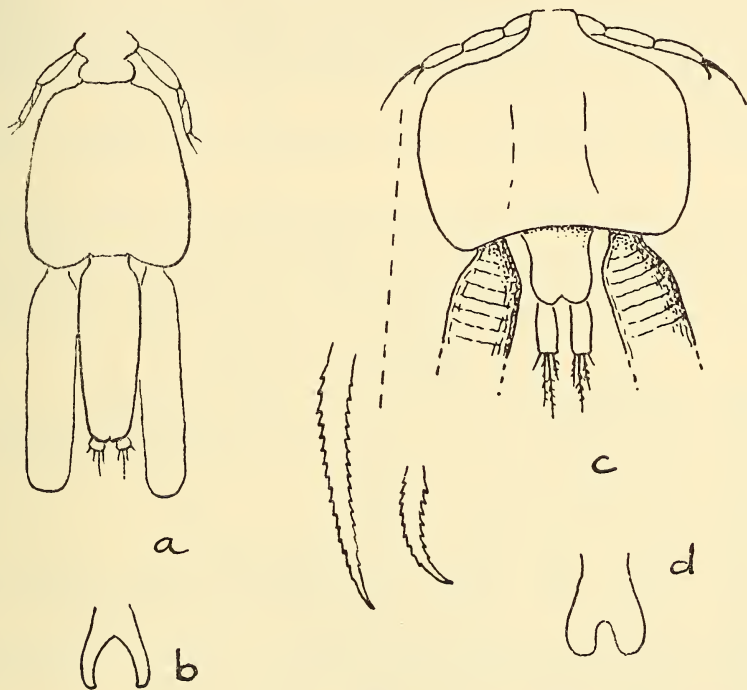


Fig. 10. *Caligus arii* B-S. *a*, genital segment and abdomen ♀; *b*, furca. *Caligus engraulidis* Brnrd. *c*, genital segment and abdomen ♀, apical spines of 4th leg further enlarged; *d*, furca.

rounded, only slightly produced, without processes or rudiments of 5th legs. Abdomen a little less than half length of genital segment, oblong; caudal rami a little shorter than abdomen, with 3 long plumose setae. Furca with short, rather stout, and narrowly separated prongs. 4th leg with 1 long and 1 short spine on apex of 3rd joint, both serrate on both margins. Ovisacs stout, about as long as body.

3.5 mm.

*Locality.* Zwartkops River, Algoa Bay, on *Engraulis (Anchoviella) holodon*.

1 ♀.

*Caligus tetradontis* Brnrd.

Fig. 9 d-f.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 245, fig. 4.

♀—Carapace about half total length. Genital segment cordate, a little wider than long, hind corners rounded, not produced, 5th legs represented by 2-3 fine setules (better visible in immature ♀). Abdomen a little less than half length of genital segment, obscurely 2-segmented; caudal rami nearly as long as broad, with plumose setae. Furca with narrow, divergent prongs. 4th leg with 1 spine on apex of 2nd joint, and 3 spine-setae of varying lengths on apex of 3rd joint, with 2 short biserrate spines (scales) at their base. Ovisacs stout.

♂—Genital segment longer than broad, hind corners obliquely bevelled off, showing tufts of setae (3 and 2 respectively) representing 5th and 6th legs. Abdomen distinctly 2-segmented, 1st segment shorter but slightly wider than 2nd, with convex lateral margins, 2nd about as long as wide, with straight sides.

4-5 mm.

*Locality.* Port Elizabeth, on *Tetrodon hypselogeneion*. 2 ovig. ♀♀, 2 juv. ♀♀, 4 ♂♂.

*Remarks.* Closely allied to *parvus* Bassett-Smith from Bombay, also parasitic on a species of *Tetrodon*. The present specimens, however, are larger (*parvus*: ♀ 3.4, ♂ 2.3 mm.), the abdomen and caudal rami are longer, and the prongs of the furca longer. The abdomen of *parvus* is apparently only 1-segmented.

Gen. *Lepeophtheirus* Nordmann1832. Nordmann, *Mikr. Beitr. Wirbellos. Thiere*, ii, p. 30.1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 453 (list of species).1905. Wilson, *Proc. U.S. Nat. Mus.*, xxviii, p. 615 (key to species).1908. id., *ibid.*, xxxiii, pp. 600 sqq.1908. id., *ibid.*, xxxv, pp. 439 sqq.1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 64.1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 409, and 606 (in key).1933. Gurney, *Brit. Freshwater Copep.*, iii, p. 324 (development)1936. Yamaguti, *Parasit. Copep. Japan*, pt. 2, Caligoida 1, pp. 10-15.

1939. id., pt. 5, Caligoida 3, pp. 449-53.

1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, pp. 533 sqq.

Carapace large, broadly oval or subcircular. Fourth segment free, without dorsal plates. Genital segment simple, without plates or processes. Abdomen 1-, 2- (or 4-) segmented; caudal rami moderate. No frontal lunules. Maxilla 2 small, bifurcate. Sternal fork present. 1st and 4th legs uniramous, 2nd and 3rd biramous; 4th leg 4-jointed, sometimes 3-jointed. Rudiments of 5th and 6th legs sometimes present. Ovisacs elongate, uniseriate.

Closely resembling *Caligus*, but without the frontal lunules.

*Key to the South African species*

1. Abdomen (♀) well developed.
  - a. Furca with narrow acute prongs.
    - i. Carapace subcircular, considerably more than half total length. 4th leg 4-jointed.
    - ii. Carapace oval, very little more than half total length. 4th leg 3-jointed.
  - b. Furca with broad, blunt prongs.

*insignis*  
sp.  
*lichiae*

2. Abdomen very short, concealed under genital segment.

- a. No rudiments of 5th legs on genital segment (♀).  
 b. Rudiments of 5th legs on genital segment (♀).

*brachyurus*  
*plotosi*

*Lepeophtheirus insignis* Wilson

Fig. 11.

1908. Wilson, loc. cit., p. 444, pls. 70, 71.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 247.

♀—Carapace subcircular, about as wide as long, considerably more than half total length. Eyes minute. 4th segment rather prominent laterally, not as wide as genital segment, which is ovoid, longer than broad in adult. Abdomen of one segment, oblong, shorter than genital segment in adult. Furca with simple rather widely diverging prongs.

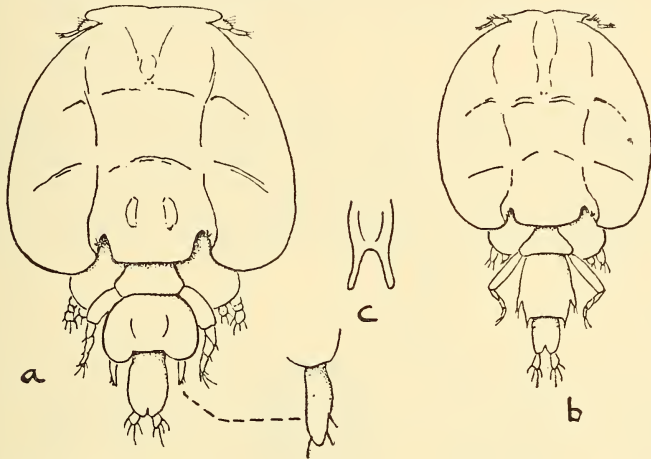


Fig. 11. *Lepeophtheirus insignis* Wilson. a, immature ♀, 6th leg further enlarged; b, ♂; c. furca.

♂—Similar to ♀, but carapace relatively slightly larger. Genital segment ovoid, with rudiments of 5th and 6th legs. Abdomen 2-segmented.

♀ 11.75 mm., carapace 6.5 mm., ♂ 6.6 mm., carapace 4 mm. (Wilson). Yellowish, chitinous ribs and thickenings on carapace purple, internal oviducts orange, ovisacs yellow (Wilson). White marbled with reddish-grey (K.H.B.).

*Locality.* Table Bay, on Sunfish (*Mola mola*). 1 immature ♀, 1 ♂ (K.H.B.).

*Distribution.* Coast of Southern California, on *Mola mola*.

*Remarks.* The ♂ (carapace 4 × 4 mm.) corresponds closely with Wilson's description. The ♀ (carapace 5 × 5 mm.) clearly belongs to Wilson's species but is in a stage intermediate between the young ♀ figured on pl. 71, fig. 51, and the adult figured on pl. 70, fig. 37; the genital segment is more ovoid than in fig. 51 but has not reached its full length as shown in fig. 37. The 6th leg is narrower than in fig. 51; there is no trace of a rudimentary 5th leg. (Comparison of pl. xxii, fig. 273, and pl. xxv, fig. 311, in Wilson's 1905 paper

with pl. 70, fig. 44, in the 1908 paper leaves a doubt whether these trispinose appendages represent the 5th or the 6th legs; in the former paper they are called the 5th, in the latter the 6th.)

*Lepeophtheirus* sp.

Two ovigerous ♀♀ of a species very close to *L. longispinosus* Wilson (1908, *Proc. U.S. Nat. Mus.*, xxxiii, p. 604, pl. 52) were taken by Mr. C. L. Biden from

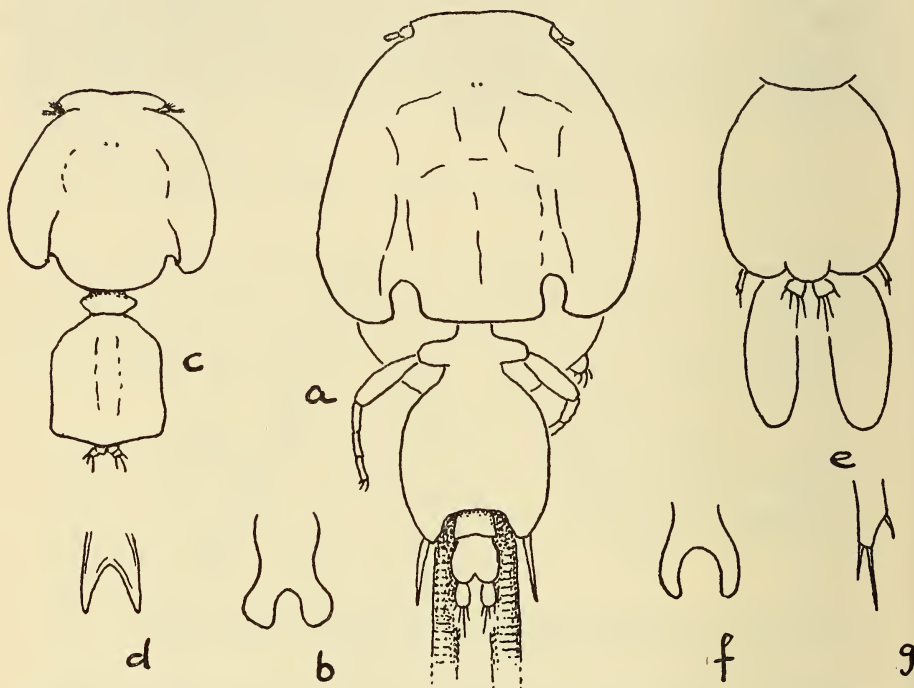


Fig. 12. *Lepeophtheirus lichiae* Brnrd. a, ♀; b, furca. *Lepeophtheirus brachyurus* Heller. c, ♀; d, furca. *Lepeophtheirus plotosi* Brnrd. e, genital segment and abdomen ♀; f, furca; g, 5th leg.

a Sand Shark (*Rhinobatus*) at Durban 1953. Wilson's species was taken from a Hammerhead Shark off the coast of North Carolina.

The present specimens agree with Wilson's species in having the 4th leg 3-jointed, but differ in the shape of the furca which consists of 2 small acute subparallel prongs.

5 mm., ovisacs 3 mm. Whitish.

*Lepeophtheirus lichiae* Brnrd.

Fig. 12 a, b.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 247, fig. 5.

♀—Carapace oval, about as broad as long, very slightly more than half total length. Eyes minute. 4th segment laterally prominent, almost as wide as

genital segment, which is slightly broader than its median length; posterior corners of genital segment lobately produced, with a strong straight spine arising from ventral surface and projecting backwards,  $\frac{3}{4}$  length of segment. Abdomen a little longer than half median width of genital segment, 2-segmented. Furca with broad, apically rounded prongs.

7.5 mm.

*Locality.* Natal, on *Lichia amia*. Ovig. and nonovig, ♀♀.

*Remarks.* The spines on the genital segment are reminiscent of *Gloiopotes*.

*Lepeophtheirus brachyurus* Heller

Fig. 12 c, d.

1865. Heller, 'Novara', *Crustac.*, p. 185, pl. 16, fig. 4.

1906. Wilson in *Herdman's Ceylon Pearl Oyster Fish Rep.*, v., p. 190. pl. 1, figs. 1-10.

1948. Barnard, loc. cit., p. 248.

♀—Carapace as broad as long, slightly longer than half total length, hind margin strongly convex and extending farther backwards than lateral lobes. 4th segment less than half width of genital segment, which is about as long as wide, subquadrangular with anterior angles bevelled off, hind margin very slightly convex medianly; no rudiments of 5th or 6th legs. Abdomen extremely short, inserted ventrally, scarcely visible dorsally. Furca with simple, diverging prongs.

5 mm.

*Locality.* Durban, on *Tetrodon hypselogeneion*, 1 ♀.

*Distribution.* Java, on *Tetrodon calamariae*; Ceylon, on *T. stellatus*.

*Remarks.* This specimen in so far as a comparison is possible (4th legs missing) is very like Heller's species. His figure shows the genital segment subcircular, not subquadrate, and the 4th legs as 2-jointed.

*Lepeophtheirus plotosi* Brnrd.

Fig. 12 e-g.

1948. Barnard, loc. cit., p. 248, fig. 6.

♀—Carapace about as broad as long, slightly longer than half total length. 4th segment well developed. Genital segment oval, longer than wide, hind corners rounded, not at all produced, with distinct rudimentary 5th legs. Abdomen very short, broader than long, attached to dorsal surface of genital segment; caudal rami shorter than abdomen, broader than long. Furca with narrow prongs, sinus wide, U-shaped. Ovisacs stout, as long as genital segment.

3.5 mm.

*Locality.* East London, on gills of *Plotosus anguillar*.

*Remarks.* The three species listed by Bassett-Smith as parasitic on Bagrid fishes: *bagri* Dana, *quadratus* Kr., and *longipalpus* B-S. all have a 2-segmented abdomen. I have not seen descriptions of the first two, but the third has an elongate abdomen.

## Fam. EURYPHORIDAE

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 415.

Gen. *Alebion* Kröyer

1863. Kröyer, *Naturh. Tidsskr.* (3), 2, p. 239.

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxi, p. 702 (key to species).

1932. id., loc. cit., pp. 418, 606.

1951. Gnanamuthu, *Ann. Mag. Nat. Hist.* (xii), 4, p. 1237.

1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, 2, p. 655.

Sexes nearly similar. Head and first 3 thoracic segments fused into a shield-like carapace. Fourth segment free, with a pair of dorsal plates in ♀, but these much reduced or absent in ♂. Genital segment with hind corners usually produced in ♀, rounded in ♂. Abdomen 2-segmented, hind corners of basal segment in ♀ produced. Caudal rami lamelliform. First 3 pairs of legs biramous, outer rami with large horny claws, rami of 1st leg 2-jointed, of 2nd and 3rd 3-jointed, 4th legs rudimentary. No frontal lunules. No furca.

On sharks.

*Alebion carchariae* Kröyer

Fig. 13 a.

1863. Kröyer, loc. cit., p. 165, pl. 12 (page and plate quoted from Wilson, 1932).

1907. Wilson, loc. cit., xxxi, p. 704 (in key).

1932. id., loc. cit., p. 422, fig. 266.

1953. Capart, loc. cit., p. 655, fig. 3.

♀—Carapace subcircular, about as wide as long, median lobe short, truncate, with 2-4 denticles at each postero-lateral corner. Dorsal plates of 4th segment subtriangular, separated by a triangular notch. Genital segment widest behind middle, lateral margins distally fringed with spines; posterior processes flattened, upper margins fringed with spines; centre of segment gibbous, hind margin excavate, without spines or denticles.

9 mm. (Wilson: 14 mm.).

*Localities.* Ifafa, Natal, on a shark (Dept. Zool. Rhodes Univ. Grahamstown, 1948); Durban, on *Carcharinus* (C. L. Biden 1951).

*Distribution.* N. Atlantic, Cape Verde Islands, Senegal.

*Remarks.* The present specimens agree with *carchariae* except the processes of the genital segment are spinose along the upper margin as in *crassus*.

## Fam. TREBIIDAE

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxi, p. 669 (*Trebiniae* [sic]).

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 413 (*Trebidae* [sic]).

Gen. *Trebius* Kröyer

1838. Kröyer, *Naturh. Tidsskr.*, ii, p. 30.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 461.

1907. Wilson, loc. cit., p. 672 (key to the 3 species known).

1932. id., loc. cit., p. 413, and 604 (in key).

1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 665.



Sexes similar. Head and first 2 thoracic segments fused into a shield-like carapace. 3rd and 4th segments free, without dorsal plates. Abdomen elongate, 1-3-segmented. No frontal lunules. Furca present. All 4 pairs of legs biramous, rami of 1st leg 2-jointed, of the other legs 3-jointed (or inner ramus of 4th leg 2-jointed). Rudiments of 5th and 6th legs on genital segment in ♂. No adhesion pads. Ovisacs elongate, uniseriate.

On skates (rays) and Dogfish.

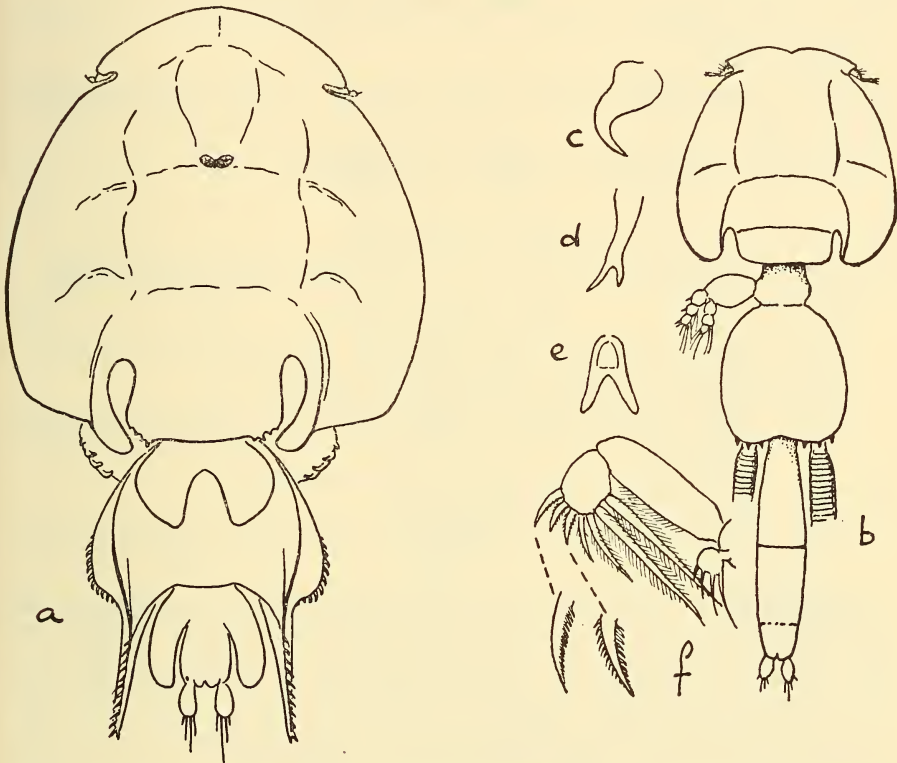


Fig. 13. *Alebion carchariae* Kröyer. a, ♀. *Trebius caudatus* Kröyer. b, ♀; c, maxilla 1; d, maxilla 2; e, furca; f, 1st leg.

*Trebius caudatus* Kröyer

Fig. 13 b-f.

1838. Kröyer, loc. cit., p. 30, pl. 1, fig. 4 (♀).  
 1863. id., *Naturh. Tidsskr.* (3), ii, p. 149, pl. 10, fig. 1 (♂).  
 1907. Wilson, loc. cit., p. 681, pl. 15, figs. 11-13, pl. 16, figs. 14-22.  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 81, pl. 22, figs. 1-2, pl. 54, figs. 1-11.  
 1934. Gurney, *Proc. Zool. Soc. Lond.*, 1934, 2, p. 192, figs. 18-20 (development).

1941. Sproston & Hartley, *J. Mar. Biol. Assoc. Plymouth*, xxv, p. 393 (bionomics).

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀—Carapace subcircular, well arched dorsally. Eyes obsolete in adult. Genital segment oval, hind corners rounded, each with 3-4 denticles. Abdomen subequal to carapace, longer than genital segment, fusiform, more or less distinctly 3-segmented. Furca with narrow divergent prongs. Maxilla 2 apically bifurcate.

♂—Genital segment barrel-shaped. Abdomen a little longer than genital segment, 2-segmented.

10mm.

*Locality.* Table Bay, on skate (*Raia marginata*). 13 ♀♀ in poor condition (S. Afr. Mus.).

*Distribution.* British Seas, on skates and dogfishes.

#### Fam. PANDARIDAE

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, pp. 325, 345 (*Pandarinae*).

#### Gen. *Pandarus* Leach

1816. Leach, *Encycl. Brit.*, ed. 5, Suppl., p. 405 (♀).

1819. id., *Dict. Sci. Nat.*, xiv, p. 535 (♂) (*Nogaus*).

1840. Milne Edwards, *Suite à Buffon (Crust.)*, iii, p. 460 (*Nogagus* pro *Nogaus*).

1907. Wilson, loc. cit., pp. 346, 387 (key to species).

1913. Scott, T. & A., loc. cit., p. 94.

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 432, and (in key) 607, 609.

Sexes dissimilar. Head and 1st thoracic segment fused. Carapace smooth, without grooves, postero-lateral lobes moderate, hind margin excavate, dentate. Free thoracic segments (3) each with a pair of plates, those on segment 2 dorso-lateral, the others dorsal. Genital segment large, posterior corners more or less lobately prolonged. Segment 6 represented by a median plate concealing the abdomen. Abdomen short, broad, 2-segmented, covered ventrally by a short broad median plate. Caudal rami attached laterally to the ventral median plate, flattened, subtriangular or more or less conical and acicular. Four pairs of adhesion pads: at bases of 1st and 2nd antennae, between bases of 1st maxillipeds and opposite 1st legs. Antenna 1 2-jointed; antenna 2 with apical claw. Maxilliped 2 swollen, with a pair of knobs. Four pairs of biramous legs, spinose and indistinctly jointed legs. Ovisacs elongate filiform, uniseriate.

♂—Carapace broadly oval, posterior lobes prominent, posterior margin straight, usually with a pair of accessory lobes, lateral grooves distinct. Free thoracic segments without dorsal plates, but the first with lateral lobes. Genital and 6th segments fused, with 2 pairs of rudimentary legs. Abdomen 2-segmented; caudal rami laminate, with 4 plumose setae. Maxilliped 2 with apical claw or corrugated knobs. All 4 pairs of legs biramous, both rami 2-jointed, with long plumose setae.

On various sharks and dogfishes.

*Key to the South African species (♀♀)*

1. Dorso-lateral plates of 2nd segment not extending beyond ends of plates on 3rd segment.
  - a. Caudal rami not very prominent. *bicolor*
  - b. Caudal rami prominent. 3rd and 4th segments each with a pair of dorsal spines. *armatus*
2. Dorso-lateral plates of 2nd segment extending beyond ends of plates on 3rd segment.
  - a. Dorsal plates of 3rd segment fused. *cranchii*
  - b. Dorsal plates of 3rd segment separate (in adult). *smithii*

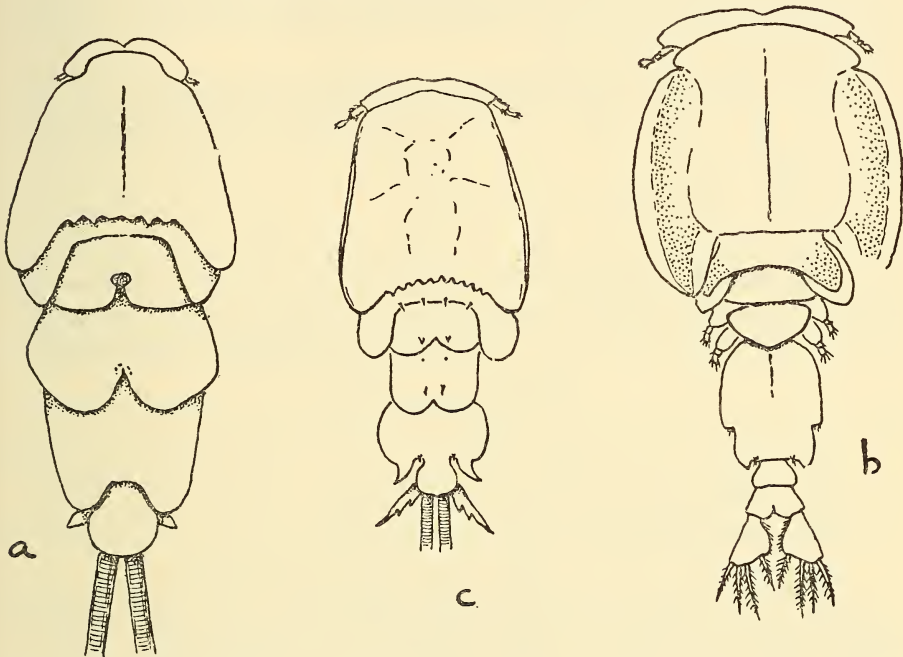


Fig. 14. *Pandarus bicolor* Leach. a, ♀; b, ♂, right corner of carapace cut away. *Pandarus armatus* Heller. c, ♀ (copy after Heller).

*Pandarus bicolor* Leach

Fig. 14 a, b.

1816. Leach, loc. cit., p. 405, pl. 20, figs. 1, 2 (♀).  
 1900. Scott, T., *Rep. Fish. Board Scotl.*, xviii, pt. 3, p. 157, pl. 6, figs. 33-8 (*Nogaus* ♂).  
 1907. Wilson, loc. cit., p. 400, pl. 27 (♀).  
 1913. Scott, T. & A., loc. cit., p. 95, pl. 21, fig. 2, pl. 22, figs. 5, 6, pl. 26, figs. 4-19, pl. 58, figs. 1-8 (♀ ♂).  
 1932. Wilson, loc. cit., p. 436, fig. 274 (♀ ♂).  
 1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀—Carapace widest posteriorly, hind margin dentate. Dorso-lateral plates of 2nd segment not reaching beyond plates of 3rd segment; the latter with

narrow median sinus, more or less expanded anteriorly; plates of 4th segment overlapping genital segment for about half its length, with angular sinus. Genital segment with broadly rounded posterior lobes; 6th segment plate at least half width of genital segment, subcircular. Caudal rami short, laminate, triangular, thickened on anterior margin.

♂—Carapace as wide as long, no accessory lobes on hind margin. 2nd segment with lateral lobes (in adult), 3rd and 4th successively narrower; genital segment wider than 4th, hind corners shortly lobed. Caudal rami subtriangular.

♀ 9–10 mm., ovisacs 15–16 mm.; ♂ 6–7 mm. ♀ yellowish, when adult with dark chestnut brown patches on 1st joint of 1st antennae, carapace (except a Y-shaped pale median mark and the hind lobes); dorsal plates of 3rd and 4th segments brown; ♂ pale yellow.

*Localities.* Table Bay and False Bay, on *Carcharius* and *Galeorhinus*. ♀♀ adult and juv., ♂♂ (S. Afr. Mus.); Durban, from nostrils of Grey Shark (C. L. Biden, 1953).

*Distribution.* British Seas, North Atlantic.

*Remarks.* The figure of a ♂ given by Wilson 1932 after T. Scott is that of an immature example. Wilson's figures (1907 and 1932) of the caudal rami in dorsal view scarcely convey the impression that they are really triangular; Wilson's figure (1907, pl. 27, fig. 123) of the ventral surface is more correct.

#### *Pandarus armatus* Heller

Fig. 14 c.

1865. Heller, *Reise 'Novara', Crust.*, p. 202, pl. 19, fig. 4.

1907. Wilson, loc. cit., p. 395 (in key only).

1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.

1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 659, fig. 7.

♀—Carapace oblong, only slightly wider posteriorly. Dorso-lateral plates of 2nd segment not extending beyond plates of 3rd segment, 4 spines on hind margin between the lobes. Plates of 3rd and 4th segments with moderate median sinus, each with a spine near hind margin (i.e. a pair of spines on each fused plate). Genital segment wider than 4th segment plates, lateral margins convex, with deep notch anterior to the acute hind corners. 6th segment plate rather bluntly rounded apically. Caudal rami prominent, extending considerably beyond 6th segment plate.

8 mm.

*Locality.* Cape of Good Hope, on *Scyllium africanum* (Heller).

*Distribution.* Senegal, on *Sphyrna tudes* (Capart).

#### *Pandarus cranchii* Leach

1819. Leach, *Dict. Sci. Nat.*, xiv, p. 535.

1907. Wilson, loc. cit., p. 403, pl. 28.

1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 14, pl. 3, fig. 1 (coloured).

1923. Wilson, *Ark. Zool.*, xv, 3, p. 9.

1932. id., loc. cit., p. 435, fig. 273.

1935. id., *Pap. Tortugas Lab. Carneg. Inst.*, xxix (452), p. 333, pl. 5, figs. 53-70, pl. 6, fig. 71.  
 1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 27, figs. 76-8.  
 1948. Barnard, loc. cit., p. 249.

♀—Carapace broad, widest posteriorly, length (incl. lateral lobes) nearly as long as rest of body (excl. 6th segment). Dorso-lateral plates of 2nd segment reaching beyond dorsal plates of 3rd segment to about half length of those of 4th segment; 3rd segment plates broad, sinus deep; 4th segment plates covering at least half of genital segment, with broad but shallow sinus. Genital segment with pointed posterior lobes, the outer margin of lobe more or less concave; 6th segment plate subcircular but with distinct basal neck. Caudal rami acicular.

♂—[after Wilson] Accessory lobes on carapace present, longer than wide. Genital segment with hind corners and a lateral lobe acute, rudiments of 5th and 6th legs represented by spines.

♀ 8 mm., ovisacs 8 mm.; ♀ yellowish, more or less suffused dorsally with dark chestnut brown, the median pale mark on carapace often more oblong or cuneiform than Y-shaped.

*Localities.* Durban (Wilson); Natal coast, on *Stegostoma fasciatum*, ♀♀, and on Hammerhead Shark, ♀♀; off Tugela River mouth, ♀ (S. Afr. Mus.).

*Distribution.* North Atlantic, east coast of N. America, Cape Verde Islands, Gulf of Guinea, Bay of Bengal, Pacific.

*Remarks.* In the present specimens the lobes of 2nd thoracic segment do not extend so far back as in Wilson's descriptions and figures; but that is not of great importance.

Wilson (1907) makes *zygaenae* Brady a synonym of *satyrus* Dana. Perhaps both might be combined with *cranchii* as there seems very little real difference.

#### *Pandarus smithii* Rathbun

1886. Rathbun, *Proc. U.S. Nat. Mus.*, ix, p. 315, pl. 5, fig. 3, pl. 7, fig. 9.  
 1907. Wilson, loc. cit., p. 410, pls. 29, 30.  
 1932. id., loc. cit., p. 434, fig. 272.  
 1944. Brian, *An. Mus. Argentino*, xli, p. 202, pl. 5, fig. 40.  
 1948. Barnard, loc. cit., p. 249.

♀—Carapace broad, widest posteriorly, length (incl. lateral lobes) almost as long as rest of body. Dorso-lateral plates of 2nd segment extending beyond ends of 3rd segment plates to about half length of those of 4th segment; the dorsal area is demarcated by grooves, but, although described as a plate (Wilson), has no free edges. Plates of 3rd segment completely separated (at least in adult). Plates of 4th segment covering more than half genital segment, with moderately deep notch. Genital segment with pointed posterior lobes, their outer margin slightly concave; 6th segment plate slightly longer than wide. Caudal rami prominent, trapezoidal, outer (thickened) and inner margins nearly parallel, apical margin oblique, denticulate.

♂—[after Wilson] Accessory lobes on carapace present, broader than long. Genital segment not wider than the preceding free segments, hind corners and lateral lobe not very acute.

♀ 9 mm. Yellowish, greater part of carapace, except hind margin and a transverse crescentic mark over the ocular area, and all the dorsal plates more or less suffused with dark chocolate brown.

*Localities.* Table Bay, on *Carcharias*, 2 ♀♀ (S. Afr. Mus.); Durban, on *Carcharinus* (C. L. Biden 1951, ♀♀).

*Distribution.* East coast of N. America and Gulf of Mexico, Hawaiian and Laysan Islands, Argentine.

Gen. *Perissopus* St. & L.

1861. Steenstrup & Lütken, *K. Dansk. Videas. Sels. Skr.* (5), v, p. 393.  
 1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 468.  
 1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 352, and p. 340 (larval stages).  
 1930. Leigh Sharpe, *Mem. Mus. Roy. Hist. Nat. Belge* (H.s.) III, 2, p. 7.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 424, and 608, 609 (in key).  
 1945. Heegaard, *Ark. Zool.*, xxxv, A 18, p. 18 (discussion on *Nogagus*).  
 1951. Gnanamuthu, *Spolia Zeylanica*, xxvi, 1, p. 9.

♀—Body ovate, squarish posteriorly. Carapace smooth, without grooves. Free thoracic segments (3) each with a pair of plates, those on 2nd segment dorso-lateral but fused across middle line, those on 3rd and 4th dorsal, meeting but not fused medianly. Genital segment large, postero-lateral corners quadrate, posterior margin with small excision through which abdomen and caudal rami are more or less visible. Abdomen 1-segmented. Terminal joints of 2nd maxilliped enlarged, fleshy, reniform, rough and scaly. Four pairs of biramous legs, rami of 3rd and 4th pairs minute; 5th pair obsolete. Four pairs of adhesion pads. Ovisacs straight, elongate, uniseriate.

♂—Carapace longer than wide; 2nd thoracic segment with small lateral plates, 3rd and 4th segments without plates. Genital segment with 5th legs. Abdomen 1-segmented, caudal rami large, with plumose setae. Maxilliped 2 with stout claw shutting against a pair of corrugated knobs. All 4 pairs of legs biramous, 2-jointed, but joints of 4th pair more or less fused.

On sharks.

*Perissopus dentatus* St. & L.

Fig. 15 a.

1861. Steenstrup & Lütken, loc. cit., p. 393, pl. 12, fig. 25.  
 1887. Rathbun, *Proc. U.S. Nat. Mus.*, x, p. 560, pls. 29, 30 (*communis*).  
 1899. Bassett-Smith, loc. cit., p. 468.  
 1907. Wilson, loc. cit., p. 354, pls. 17, 18 (*communis*).  
 1924. Brian, *Parasitolog. Mauritanica*, fasc. 1, p. 33 (*communis*).  
 1932. Wilson, loc. cit., p. 425, fig. 267 (*communis*).  
 1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 662.

♀—Carapace narrowed anteriorly, large, about  $\frac{3}{4}$ – $\frac{4}{5}$  length of genital segment. A large knob on ventral surface of carapace near the margin, external to the large 2nd maxilliped. Plates on 2nd and 4th segments with denticulate margins, those on 3rd segment with entire margins.

♀ 6 mm. (Wilson: 3.75–4.25 mm.).

*Locality.* Durban, on Milk Shark (*Scoliodon*). 3 ♀♀, C. L. Biden, 1953.

*Distribution.* Eastern coast of N. America, on various sharks and dogfish (Wilson); coast of Mauritania (Brian); Senegal (Capart).

*Remarks.* Wilson (1907) maintains *communis* as a valid species distinguished from *dentatus* St. & L. by relative sizes of carapace and genital segment (1907, p. 353 in key), the knob on ventral surface of carapace, and certain details (1907, p. 361).

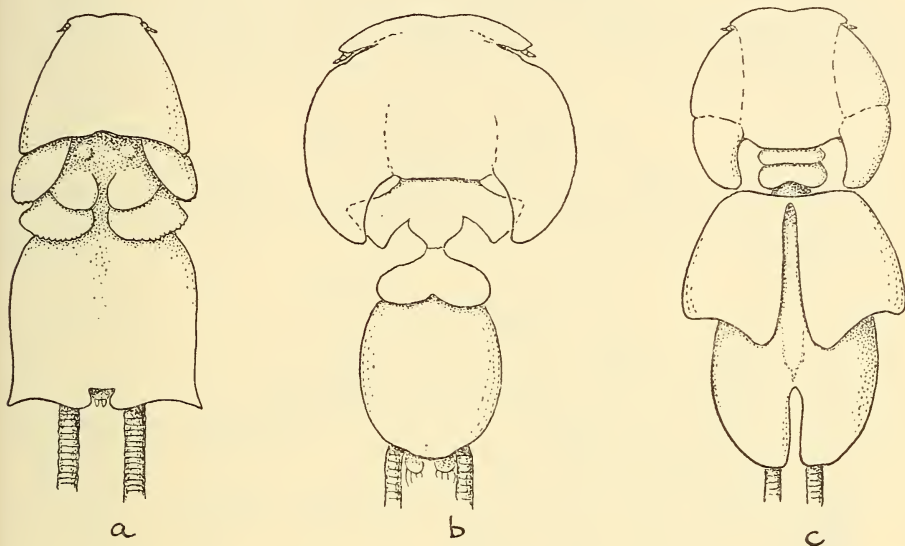


Fig. 15. *Perissopus dentatus* St. & L. a, ♀; *Nesippus alatus* Wilson. b, ♀. *Echthrogaleus coleoptratus* (Guérin). c, ♀.

#### Gen. *Dinemoura* Latr.

1814. Rafinesque, *Précis Som.*, p. 31 (*Dinemurus*).  
 1829. Latreille, *Règne Anim.*, iv, Crust., p. 197.  
 1835. Burmeister, *Nova Acta Ac. Leop. Carol.*, xvii, 1, p. 284 (*Dinematura*).  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 85.  
 1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 374 (key to species) (*Dinematura*).  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 430, and 608, 609 (in key) (*Dinematura*).  
 1943. Dollfus, *Bull. Inst. ocean. Monaco*, 851, p. 7 (comparison *Dinematura* with *Demoleus*).

♀—Body elongate-oval, carapace with grooves. Dorsal plates on 4th segment moderate, divided by a deep sinus. Genital segment oblong. Segment 6 distinctly separated from genital segment, with a pair of dorsal plates, and ventrally a rudimentary pair of legs. Abdomen small, one-segmented; caudal rami laminate, with nonplumose setae. Two adhesion pads behind each antenna 1. Maxilliped 2 with terminal claw closing between 2 knobs on basal

joint. Four pairs of biramous legs, both rami of 1st 2-jointed, of 2nd and 3rd 3-jointed, of 4th laminate, 1-jointed; first 3 pairs with plumose setae, 4th without setae or spines. Ovisacs straight, elongate, uniseriate.

♂—Carapace broadly oval; 2nd segment with lateral processes, 3rd without dorsal or lateral plates, 4th with or without lateral lobes slightly overlapping genital segment. Genital and 6th segments fused. Abdomen 2-segmented; caudal rami laminate, with 4 plumose setae. All 4 pairs of legs biramous, rami of 1st and 4th 2-jointed, of 2nd and 3rd 3-jointed.

On various sharks.

Wilson (1907, p. 375) ascribes the establishment of the genus to Latreille in 1829, and makes no mention of Rafinesque 1814. Latreille seems to have altered Rafinesque's spelling. The original works are not accessible to me. But Wilson's combination '*Dinemoura* Latreille' is certainly not acceptable.

*Key to the South African species*

- |  |                  |
|--|------------------|
| 1. ♀ carapace $\frac{1}{3}$ total length. Dorsal plates of 4th segment much longer than wide, apically rounded. ♂ 4th segment without lateral lobes. | <i>producta</i>  |
| 2. ♀ carapace $\frac{1}{2}$ total length. Dorsal plates of 4th segment wider than long, posterior margin truncate. ♂ 4th segment with lateral lobes. | <i>latifolia</i> |

*Dinemoura producta* (Müller)

Fig. 16 a, b.

1785. Müller, *Entomostr.*, p. 132, pl. 21, figs. 3, 4.  
 1907. Wilson, loc. cit., p. 380, pl. 23 (references).  
 1913. Scott, T. & A., loc. cit., p. 86, pl. 22, fig. 3, pl. 26, figs. 1-3, pl. 27, figs. 1-8.  
 1923. Fage, *Bull. Soc. zool. Fr.*, xlviii, p. 281.  
 1923. Wilson, *Ark. Zool.*, xv, 3, p. 8, pl. 2, figs. 11-18 (♂).  
 1932. id., loc. cit., p. 431, fig. 270.  
 1944. Brian, *An. Mus. Argent.*, xli, p. 202 (*Dinemoura p.*).  
 1950. Matthews & Parker, *Proc. Zool. Soc. Lond.*, cxx, p. 568, figs. 14, 15 (*Dinemoura p.*).

♀—Carapace subcircular, about  $\frac{1}{3}$  total length. Dorsal plates of 4th segment longer than wide, apically rounded. Genital segment with apices of dorsal plates obliquely truncate. Abdomen quadrangular.

♂—4th segment without lateral lobes, hind margin slightly sinuous. Genital segment elliptical.

♀ up to 20 mm., ovisacs 40-80 mm., ♂ 12.5 mm.

*Locality.* Durban (Wilson).

*Distribution.* Northern Atlantic. Usually on *Lamna cornubica*, also on *Alopias*, *Scymnus*, *Laemargus*, and *Cetorhinus*.

*Remarks.* Matthews and Parker figure the ♂ and ♀ 2nd maxillipeds showing differences in the specimens taken on *Lamna* and *Cetorhinus* and differences in other appendages are noted. It is suggested that 'the species has a number of ecotypic variants associated with the different hosts' (p. 568), the differences being 'determined by the nature of the host-skin on which the larvae settle' (p. 573).



*Dinemoura latifolia* St. & L.Fig. 16 *c, d*.

1861. Steenstrup & Lütken, *K. Dansk. Viden. Selsk. Skr.* (5), v, p. 378, pl. 8, fig. 16.  
 1907. Wilson, loc. cit., p. 383, pls. 24, 25.  
 1923. id., loc. cit., p. 6, pl. 1, figs. 6-10, pl. 2, fig. 19 (immat. ♀).  
 1932. id., loc. cit., p. 432, fig. 271.  
 1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, Caligoida 2, p. 9, pls. 5, 6.  
 1944. Brian, loc. cit., xli, p. 201 (*Dinematura l.*).  
 1954. Deboutteville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 204, figs. 2, 3 (*Dinematura l.*).

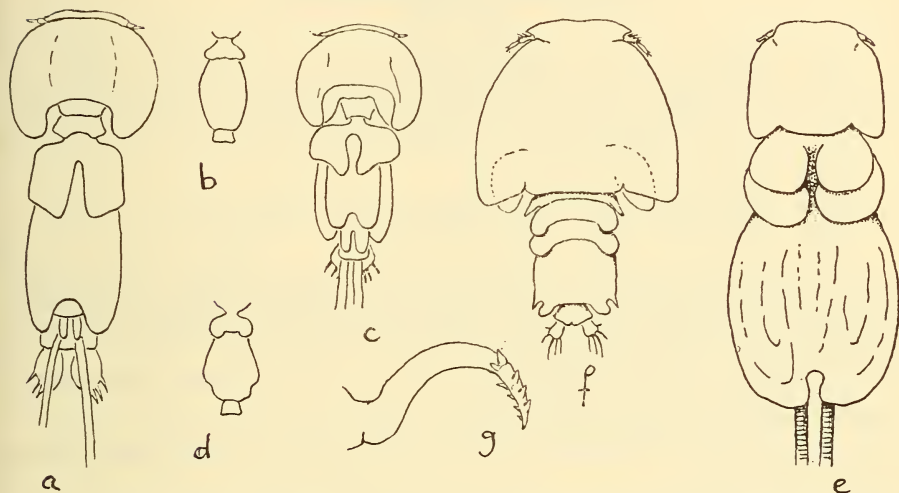


Fig. 16. *Dinemoura producta* (Müller). *a*, ♀; *b*, 4th and genital segments ♂. *Dinemoura latifolia* St. & L. *c*, ♀; *d*, 4th and genital segments ♂. *Achtheinus dentatus* Wilson. *e*, ♀; *f*, ♂. *g*, antenna ♀ (copies: *a*, after Scott; *b-d*, after Wilson).

♀—Carapace broadly ovate, about  $\frac{1}{2}$  total length. Dorsal plates of 4th segment wider than long, posterior margin truncate and slightly emarginate. Genital segment with apices of dorsal plates bluntly rounded. Abdomen kidney-shaped, twice as wide as long.

♂—4th segment with lateral lobes. Genital segment somewhat wedge-shaped.

♀ up to 16 mm., ovisacs 30 mm., ♂ 8.5 mm.

*Locality.* Durban (Wilson).

*Distribution.* Northern Atlantic and Mediterranean, Argentine, Pacific.

Gen. *Echthrogaleus* St. & L.

1861. Steenstrup & Lütken, *K. Dansk. Vidensk. Selsk. Skr.* (5), v, p. 380.  
 1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 362 (key to species).  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 426, and 608, 609 (in key).

♀—Body ovate-elliptical. Carapace with grooves. Dorsal plates of 4th segment large, covering more than half genital segment. The latter as large as or larger than carapace, with deep posterior sinus between rounded lobes. Abdomen small, wholly or partly concealed beneath genital segment; caudal rami large, with nonplumose setae. Four pairs of biramous legs, rami of 1st pair 2-jointed, outer rami of 2nd and 3rd 3-jointed, inner rami 2-jointed, rami of 4th pair large, lamellate, indistinctly jointed. Ovisacs elongate, filiform, uniseriate.

♂—Carapace broader than long, with accessory lobes on hind margin. 2nd-4th thoracic segments free, each with a pair of small dorsal plates. Genital segments much smaller than carapace. Abdomen visible in dorsal view, 2-segmented; caudal rami large, with plumose setae.

On sharks.

*Echthrogaleus coleoptratus* (Guérin)

Fig. 15 c.

1907. Wilson, loc. cit., p. 367, pl. 19.  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 559 (not the specimen there recorded, which = *Philorthrogoriscus*, q.v.).  
 1923. Wilson, *Ark. Zool.*, xv, 3, p. 13.  
 1932. id., loc. cit., p. 427, pl. 27.  
 1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, p. 7, pls. 4, 5.  
 1944. Brian, *An. Mus. Argentino*, xli, p. 202.

♀—Body more than twice as long as wide, carapace smaller than genital segment. Margins of plates on 4th segment not serrate. Abdomen concealed.

♂—Carapace subcircular. Lateral lobes of 2nd segment extending outwards, tips concealed by lobes of carapace.

♀ 12-14 mm., ♂ 3.6 mm. Yellowish; carapace, especially the central portion, and dorsal plates of 4th segment brown.

*Localities.* Durban (Wilson); Kalk Bay (False Bay), on *Carcharinus glaucus*.  
 1 ♀ (S. Afr. Mus.).

*Distribution.* Atlantic and Indian Oceans, Pacific, Argentine.

*Remarks.* In the General Catalogue of S.A. Crustacea Stebbing recorded a specimen ('No. 54') from *Orthogoriscus mola*. In tube 54, as returned to the S.A. Museum, with Stebbing's autograph label, there were 3 specimens of *Philorthrogoriscus* (not recorded by Stebbing) and no *Echthrogaleus*. The Sunfish would be an unusual host for this latter genus. (cf. 1946, Dollfus, *Ann. Soc. Sc. Nat. Charante-Maritime*, iii, 7, p. 71.)

Wilson's record, and the present specimen, however, prove that the genus does occur in South Africa, as would be expected.

Gen. *Nesippus* Heller

1865. Heller, *Reise 'Novara', zool.*, ii, Crust., p. 193.  
 1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 424.  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 438, 607, 609 (in key).  
 1943. Heegaard, *Ark. Zool.*, xxxiv, A 16, p. 6.  
 1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, p. 538 (♂ formerly ascribed to *Achtheinus*).

♀—Carapace broader than long, smooth, without grooves; 2nd and 3rd segments fused, with lateral plates; 4th segment free, with a pair of fused dorsal plates. Genital segment large, ovate, without posterior processes or rudiments of legs. Abdomen small, concealed; caudal rami large, more or less concealed. Antenna 2 uncinata. Maxilliped swollen, with terminal claw. Four pairs of biramous legs, rami of first 3 pairs 2-jointed, of 4th 1-jointed. Ovisacs elongate, filiform, uniseriate.

♂—Carapace ovate. Free thoracic segments much narrower than carapace, 2nd segment with lateral lobes. Genital segment ovate, without rudiments of legs (or these reduced to mere spines). Abdomen one-segmented; caudal rami small, with plumose setae. Maxilliped with knobs or a terminal claw. Legs resembling those of ♀.

*Nesippus alatus* Wilson

Fig. 15 b.

1907. Wilson, loc. cit., p. 426, pls. 34, 35 (♀ ♂).

1932. id., loc. cit., p. 438, fig. 276 (♀ ♂).

♀—Dorso-lateral plates of 2nd segment large, alate, angular; dorsal plates of 4th segment slightly overlapping base of genital segment.

6–7 mm., ovisacs 12–13 mm.

*Locality.* Durban, on hind part of tongue of *Carcharodon carcharias* (numerous ♀♀, C. L. Biden, 1953).

*Distribution.* Eastern coast of N. America, on various sharks (Wilson).

*Remarks.* Usually found on the gill-arches, rarely on the floor or roof of the mouth; Wilson (1932) says this is the only Copepod likely to be found inside the throat of a shark.

Heller's species *orientalis* and *crypturus* were taken at Java; neither of them have the alate plates on 2nd segment characteristic of *alatus*, and the plates on 4th segment do not reach the genital segment.

Brian (1924. 'Parasitol. Mauritanica,' fasc. 1, p. 33) identifies Mauritanian specimens with *orientalis*. Capart (1953. *Bull. Inst. franç. Afr. Noire*, XV, 2, pp. 658, 659, fig. 6) also identifies Senegal specimens with *orientalis*, and considers that more abundant material will eventually show that *alatus* Wilson and *angustatus* v. Ben. should be united with Heller's species. Capart's fig. 6 certainly suggests that the plates on 2nd segment are alate.

Gen. *Achtheinus* Wilson

1908. Wilson, *Proc. U.S. Nat. Mus.*, xxxv, p. 450.

1911. id., *ibid.*, xxxix, p. 630.

1912. id., *ibid.*, xlii, p. 235.

1924. Kurtz, *SB. Ak. Wiss. Wien. Abt.*, 1, cxxxiii, p. 613 (*Pholidopus*).

1927. Wilson, *Science*, N.Y., lxvi, p. 397 (validity of genus).

1922. id., *Ark. Zool.*, xiv, no. 10, p. 4.

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 608, 609 (in key).

1936. Yamaguti, *Parasit. Copep. Japan*, pt. 3, Caligoida 2, p. 11.

1944. Wilson, *Proc. U.S. Nat. Mus.*, xciv, p. 539.

♀—Body ovate-elliptical; carapace (head + 1st thoracic segment) smooth, without grooves; 2nd and 3rd segments fused, with a single pair of dorsal plates; 4th segment free, with a similar pair of plates. Genital segment with apical median sinus. Abdomen small, concealed beneath genital segment, caudal rami large, partly or wholly concealed. Antenna 2 stout, with strong claw. Maxilliped swollen, with slender apical claw. Four pairs of biramous legs, rami of first 3 pairs 2-jointed, of 4th pair 1-jointed. Ovisacs straight, elongate, uniseriate.

♂—Carapace, broadly ovate. Free thoracic segments much narrower than carapace, dorsal plates represented only by lateral lobes. Genital segment with rudiments of 5th legs. Abdomen 1-segmented, caudal rami laminate, with 4 setae. Antenna 2 without teeth. Maxilliped with strong terminal claw. Legs resembling those of ♀.

On sharks.

*Pholidopus* Wilson 1907 (pro *Lepidopus* Dana 1852 preocc.) and *Achtheinus* are very closely related, but Wilson (1927) showed that Kurtz's arguments were ill-founded, and maintained the validity of the latter genus.

*Key to the South African species (♀♀)*

1. Antenna 2 dentate.
2. Antenna 2 not dentate.

*dentatus*  
*pinguis*

*Achtheinus dentatus* Wilson

Fig. 16 e-g.

1911. Wilson, loc. cit., p. 630, pl. 67, figs. 22-31 (♀).  
 1912. id., loc. cit., p. 238.  
 1917. Stebbing, *Ann. S. Afr. Mus.*, xvii, p. 41, pl. 8 (*S. Afr. Crust.*, pl. 97) (♀ & ♂)  
 1921. Wilson, *Proc. U.S. Nat. Mus.*, lix, p. 6, pl. 3, figs. 20-27 (♂ & immature ♀).  
 1922. id., *Nyt Mag. Naturv.*, lx, p. 107.  
 1923. id., *Medd. Goteb. Mus. Zool. Avd.*, no. 19, p. 7, pl. 1, figs. 6-12 (♀) (*parvidens*).  
 1944. id., loc. cit., p. 537, pl. 33, figs. 196-208 (♀ & true ♂).  
 1944. Brian, *An. Mus. Argentino*, xli, p. 203, pl. 2, figs. 15-17, pl. 3, figs. 18-29 (♀ ♂).

♀—Carapace about as broad as long, posterior corners rounded (not acute as might be thought from Stebbing's figure). Antenna 2 falciform, with a double row of stout teeth apically, 4 teeth on dorsal edge and 3 on ventral edge of inner margin, and a pair of slightly larger teeth proximally to these two rows. Dorsal plates separate from their bases. Abdomen with an accessory lobe on each side at base.

♂—Carapace slightly longer than broad (as broad as long if pressed flat), hind margin as in ♀. Lateral angles of 1st free segment subacute; on 2nd and 3rd segments rounded and overlapping the succeeding segment. Genital segment quadrate, hind corner with a minute spiniferous denticle (5th leg); hind margin with a rounded exsert lobe on each side.

♀ up to 8.5 mm., ovisacs 15-18 mm.; ♂ 3.75 mm. Yellowish.

*Localities.* Algoa Bay, on shark (Stebbing); Table Bay, on *Acanthias* (Wilson); Kalk Bay, on *Mustelus* and *Carcharias*; Table Bay, on *Carcharodon* (*S. Afr. Mus.*); Natal, on dogfish (*Natal Mus.*).

*Distribution.* Coast of Peru and California, Argentine.

*Remarks.* Stebbing says Wilson's figure shows the relative length and breadth of the ♀ carapace better than his; in fact Stebbing's figure is an accurate representation of the South African specimens. Wilson (1911) described and figured the 2nd antenna as having only a single row of teeth, but corrected this statement in 1921, and in 1944 (fig. 197).

Stebbing described what he thought was a ♂, and appeared to have considered this the first description of the ♂ of this genus. Wilson, however, in 1912 had described a ♂ assigned to *A. pinguis*.

In 1921 Wilson, without reference to Stebbing's 1917 paper, described a ♂ assigned to *dentatus*, and also immature ♀♀. Wilson's immature ♀, 3.5 mm. in length, corresponds with the specimen described by Stebbing as a ♂. Stebbing found his specimen attached to the underside of the genital segment of a ♀, with the head pointing forwards. Among other specimens of the same lot there are several such 'pairs', and from the position of the smaller specimens one would naturally assume them to be males.

In 1944 Wilson, again without reference to Stebbing, retracted his 1912 description of the ♂ of *pinguis* (assigning it to *Nesippus*\*), and also his description of the (supposed) ♂ of *dentatus*. The supposed immature ♀♀ are now regarded as ♂♂.

Thus Stebbing was right in claiming the first description of the ♂, not only of *dentatus*, but of the genus *Achtheinus*.

Wilson's *parvidens* is obviously a synonym.

*Achtheinus pinguis* Wilson

1912. Wilson, loc. cit., p. 235, pl. 31, figs. 8-14 (♂), pl. 32, figs. 15-21 (♀).

1923. id., *Ark. Zool.*, xv, 3, p. 5.

1941. Capart, *Mem. Mus. R. Hist. Nat. Belge*, ser. 2, fasc. 21, p. 184, figs. 5-7.

Not 1944. Wilson, loc. cit., p. 538 (♂ = *Nesippus*).

♀—Similar to *dentatus*, but antenna 2 not dentate.

5.75 mm.

*Localities.* Cape of Good Hope, on Saw-shark (*Pliotrema warreni*) (Wilson); Table Bay, on 'dogfish shark' (Wilson); off Dassen Island (West coast), on *Acanthias vulgaris* (Capart).

*Remarks.* The differences in plumpness and relative width of carapace between this species and *dentatus*, mentioned by Wilson, would not seem to be of great significance.

Unfortunately the only specimens (♀♀) in the South African Museum from *Pliotrema* have lost the 2nd antennae, and are therefore only presumed to be *pinguis*. They were collected in 1898 by Dr. Gilchrist, then Marine Biologist to the Cape Government.

\* See Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 424.

## Fam. CECROPIDAE

1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 461 (*Cecropinae*).  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 441.

The four genera, three of which occur in South Africa, are found most commonly on Sunfishes (*Molidae*), but are found occasionally also on *Diodon*, *Thynnus*, and other Teleosts, and on sharks.

More gregarious than the *Pandaridae*, and when thus congregated in bunches cause sores and pits in the flesh of the host. Both sexes are incapable of swimming.

Gen. *Cecrops* Leach

1816. Leach, *Encycl. Brit.* (suppl. to 4th-6th eds.), I, (2), p. 405.  
 1907. Wilson, loc. cit., p. 466.  
 1923. id., *Amer. Mus. Nov.*, no. 80, p. 1.  
 1932. id., loc. cit., p. 441 (diagnosis of ♂ legs not quite accurate).

♀—Carapace oval, deeply emarginate posteriorly, frontal plates fused with carapace. 3rd segment with small fused dorsal plates; 4th segment with larger fused plates. Genital segment with fused dorsal plates larger than carapace. Abdomen with expanded ventral plates. Antenna 1 2-jointed. Rami of 1st-3rd pairs of legs 2-jointed, of 4th pair 1-jointed. Ovisacs numerous, irregularly coiled, concealed, uniseriate.

♀—similar to ♀ but 4th dorsal plates not completely covering abdomen. 4th pair of legs not much enlarged.

Margins of carapace and dorsal plates in both sexes smooth.

Two species, one of which is found chiefly on the Sunfish, usually attached to the gills, but has also been found on *Diodon*, *Thynnus*, and *Pleuronectes*; the other (*exiguus* Wilson 1923) on sharks.

*Cecrops latreillii* Leach

Fig. 17 a-c.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 465 (references).  
 1907. Wilson, loc. cit., p. 468, pls. 38, 39.  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 558.  
 1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 13 (references).  
 1932. Wilson, loc. cit., p. 442, fig. 278.  
 1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, p. 10, pl. 6, figs. 62-66.

Ovig. ♀ up to 30 mm., width 12-15 mm.; ♂ up to 17 mm., width 11 mm. Uniform yellowish white.

*Locality.* From the Cape (Stebbing, and S. Afr. Mus.), on the Sunfish (*Orthogoriscus* = *Mola*).

*Distribution.* Atlantic and Pacific Oceans.

*Remarks.* Heegaard (1943. *Ark. Zool.*, xxxiv, 18, p. 26) records a specimen from *Thynnus*, but suggests that this may be due to a mistake in labelling, or accidental transference from the parasite's normal host.

Gen. *Orthagoriscicola* Poche1902. Poche, *Zool. Anz.*, xxvi, p. 15.

1907. Wilson, loc. cit., p. 472.

1932. id., loc. cit., p. 443.

♀—Carapace subcuneiform, shallowly emarginate posteriorly, lateral margins serrate, frontal plates fused with carapace but their outlines indicated by grooves. Dorsal surface spinulose. 2nd and 3rd segments free, without dorsal plates; 4th segment with large fused plates, with serrate margins. Genital segment with large overlapping dorsal plates, with serrate margins. Abdomen with expanded lateral plates. Antenna 1 3-jointed. Rami of 1st and 2nd pairs of legs 2-jointed, of 3rd and 4th 1-jointed and laminately enlarged. Ovisacs numerous, irregularly coiled, concealed, uniseriate.

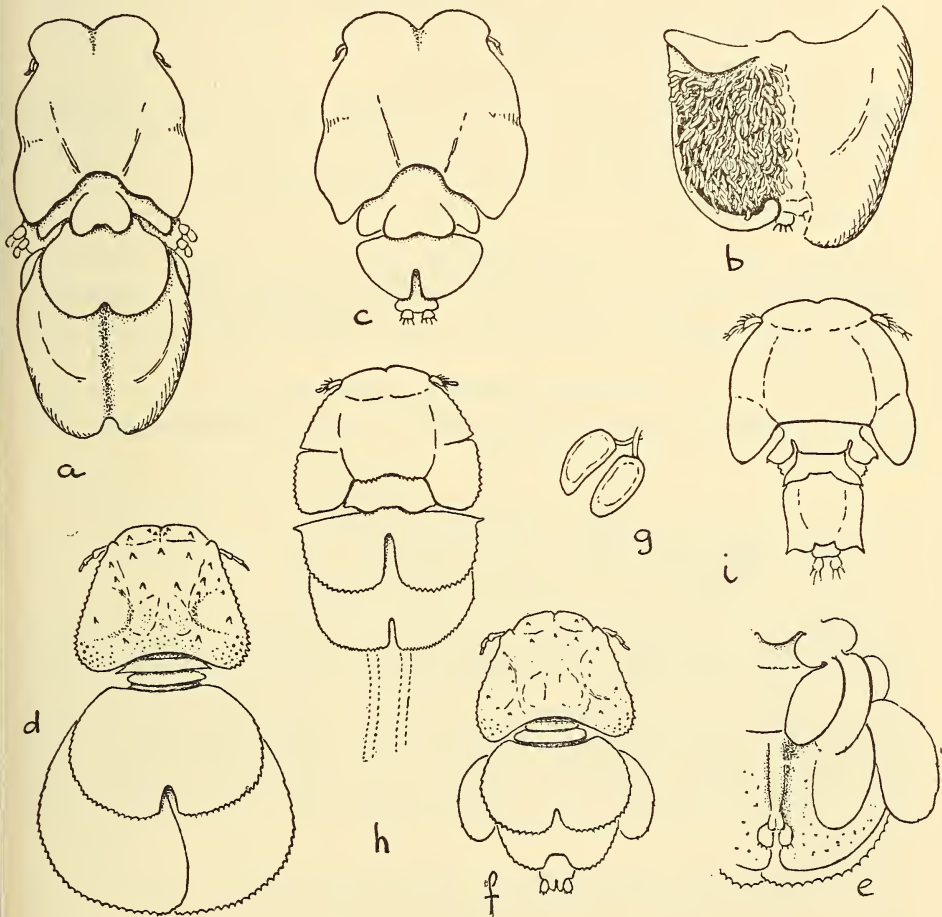


Fig. 17. *Cecrops latreillei* Leach. a, ovigerous ♀; b, genital segment ♀; left half of dorsal plate removed to show ovisacs; c, ♂. *Orthagoriscicola muricatus* (Kröyer). d, ♀; e, ventral view ♀ genital segment with abdomen and 3rd and 4th legs; f, ♂; g, ♂ spermatophores removed from ♀. *Philorthagoriscus serratus* (Kröyer). h, ♀; i, ♂ (copy after Wilson).

♂—Similar to ♀ but carapace relatively wider. Genital segment much swollen, its dorsal plates fused, with posterior sinus, margins serrate. Abdomen and caudal rami relatively larger. Rami of 1st-3rd pairs of legs 2-jointed, of 4th pair as in ♀.

A single species found on the Sunfish (*Orthogoriscus* = *Mola*), on the gills or more frequently on the surface of the skin; has also been found on *Selene vomer* (*Carangidae*).

*Orthogoriscicola muricatus* (Kröyer)

Fig. 17 d-g.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 467 (*Laemargus m.*).  
 1907. Wilson, loc. cit., p. 473, pls. 40, 41.  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 559.  
 1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 14, pl. 2, figs. 1, 2, pl. 6, figs. 5-8 (references).  
 1932. Wilson, loc. cit., p. 443, fig. 279.

Ovig. ♀ up to 20 mm., width 7-9 mm.; ♂ up to 15 mm., width 8 mm. Pale yellow.

*Locality.* Table Bay (Stebbing and S. Afr. Mus.), on *Mola*.

*Distribution.* Atlantic.

*Remarks.* Wilson states that the carapace of ♂ has the margins and dorsal surface smooth; but that is not the case with the specimens I have examined, in which the ♂ carapace resembles that of the ♀ though not so strongly serrate and spinulose.

One ♂ in the S.A. Museum collection still has the two frontal filaments attached though it is mature with fully developed spermatophores. The filaments are nearly as long as the body.

Gen. *Philorthogoriscus* Horst

1897. Horst, *Notes Leyden Mus.*, xix, p. 137.  
 1907. Wilson, *Proc. U.S. Nat. Mus.*, xxxiii, p. 478.  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 444.

♀—Carapace rounded, deeply emarginate posteriorly, lateral margins serrate, frontal plates fused. 4th segment with a pair of large plates fused at base, but deeply cleft, margins serrate. Genital segment not quite as large as carapace, with fused dorsal plates, apically cleft, margins finely serrate, antero-lateral angle acute. Abdomen concealed, without lateral expansions; caudal rami large. Antenna 1 2-jointed. Rami of 1st-3rd pairs of legs 2-jointed, with spines and setae; peduncles of 3rd pair large, concealing the small 4th pair of legs, the rami of which are 1-jointed, with spines only. Ovisacs elongate, not concealed.

♂—Carapace much larger than rest of body, 2nd and 3rd segments fused, with small lateral plate. 4th segment with rudimentary dorsal plates. Genital segment quadrangular, with short fused dorsal plates at its base, postero-lateral angles acute.

A single species parasitic on the Sunfish; originally placed in *Dinemoura* (*Pandaridae*).



*Philorthogoriscus serratus* (Kröyer)Fig. 17 *h, i*.

1863. Kröyer, *Naturh. Tidskr.*, p. 176, pl. 8, figs. 4 *a-i* (*Dinematūra s.*).  
 1897. Horst, loc. cit., p. 137, pl. 7.  
 1907. Wilson, loc. cit., p. 479, pls. 42, 43.  
 1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 12, pl. 2, fig. 3, pl. 6, fig. 9.  
 1922. Wilson, *Nyt Mag. Naturv.*, lx, p. 108.  
 1932. id., loc. cit., p. 445, fig. 280.  
 1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 249.

♀ 7.5 mm., width 4.5 mm., ovisacs (Wilson) 15 mm.; ♂ 5 mm., width 4 mm.  
 Yellowish, clouded with grey (Wilson).

*Locality.* Table Bay, on *Mola* (S. Afr. Mus.).

*Distribution.* Atlantic.

*Remarks.* A single non-ovigerous ♀ was found among the specimens of *Orthogoriscicola* identified by Stebbing, and overlooked by him; three ♀♀ returned by Stebbing labelled as 'No. 54. *Echthrogalearius coleoptratus*'.

Wilson (1922) records this species from *Squalus acanthias*.

## Fam. ANTHOSOMIDAE

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19, 20 (*Dichelesthiidae* part, *Anthosominae*).  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 446 (*Anthosomidae*).

Gen. *Anthosoma* Leach

1816. Leach, *Encycl. Brit.* (suppl. to 4th-6th eds.), I, 2, p. 406.  
 1922. Wilson, loc. cit., p. 23.  
 1932. id., loc. cit., p. 446.

♀—Body short, stout; head and 1st thoracic segment fused to form a large oval carapace. 4th segment dorsally with 2 large overlapping plates concealing the genital segment and most or all of the abdomen. Abdomen 1-segmented, caudal rami narrow, unarmed. Antenna 1 6-jointed. Antenna 2 3-jointed, stout, porrect, with apical claw. Maxillipeds stout, with strong apical claw. First 3 pairs of legs large foliaceous, inner margin of 1st and 2nd pair notched but without rami; 4th pair of legs absent. Ovisacs slender, elongate, eggs uniseriate.

♂—similar but smaller; 4th segment without dorsal plates. Inner margin of 1st and 2nd legs notched, with 2 small rami, those on 1st leg ovate, the inner one on 2nd leg 2-jointed, with 3 apical curved spines, moved by powerful muscles.

Parasitic on sharks.

*Anthosoma crassum* (Abildgaard)

Fig. 18.

1794. Abildgaard, *Skr. nat. Selsk. Copenhagen*, iii, p. 46, pl. 5, figs. 1-3. (*Caligus c.*)  
 1816. Leach, loc. cit., p. 406, pl. 20, figs. 1-6 (*smithii*).

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 468.  
 1915. Stebbing, *Ann. S. Afr. Mus.*, xv, p. 58 (record only).  
 1922. Wilson, loc. cit., p. 23, pl. 1, figs. 1-8.  
 1923. id., *Ark. Zool.*, xv, 3, p. 13.  
 1924. id., *Proc. U.S. Nat. Mus.*, lxiv, p. 12.  
 1932. id., loc. cit., p. 446, fig. 281.  
 1936. Yamaguti, *Paras. Copep. Japan*, pt. 3, Caligoida 2, p. 12.  
 1944. Brian, *An. Mus. Argentino*, xli, p. 208, pl. 5, figs. 43, 44.  
 1948. Deboutville, *Bull. Mus. Hist. Nat. Paris*, xx, 5, p. 446.  
 1952. Birkett & Burd, *Ann. Mag. Nat. Hist.* (xii), v, p. 391. fig.

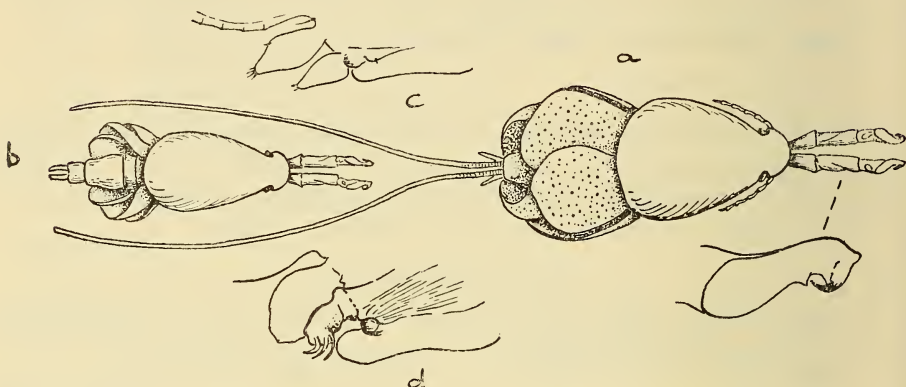


Fig. 18. *Anthosoma crassum* (Abildg.). a, ♀, with 2nd antenna further enlarged; b, ♂; c, 1st leg ♂; d, 2nd leg ♂.

♀ 15 mm., ♂ 9 mm., ovisacs 25 mm. Carapace yellowish-brown or amber, dorsal plates and foliaceous legs greyish-white, abdomen brown.

*Localities.* Durban (Stebbing, Wilson); Table Bay, False Bay, and Durban, on Porbeagle and species of *Carcharias* (S. Afr. Mus.).

*Distribution.* Europe, east and west coasts of N. America, New Zealand, Japan, Argentine. On various sharks: *Lamna*, *Carcharias*, *Isurus*, *Oxyrhyncha*, *Cetorhinus*, *Selache*.

*Remarks.* Wilson says this parasite is usually found in the throat attached to the gill-arches. Birkett & Burd record a heavy infestation in the skin of the underside of the shark, *Selache*, extending around the [axils of the] pectoral fins and into the mouth and gill-slits.

The South African Museum specimens were collected by Mr. C. L. Biden (1928 and 1953) from among the teeth of Porbeagles and species of *Carcharias*. The parasites were present in enormous numbers, closely packed together; the flesh of the jaws was raw and suppurating, and in some cases most of the teeth had fallen out. As Birkett & Burd remark, such an infestation must seriously endanger the health and even the life of the host.

Gen. *Lernanthropus* Blainv.

1822. Blainville, *J. de Physique*, xcv, p. 443.  
 1832. Nordmann, *Mikrosc. Beitr.*, ii, p. 45 (*Epachthes*).  
 1864. id., *Bull. Soc. Nat. Moscou*, xxxvii, p. 510 (*Stalagnus*).  
 1922. Wilson, loc. cit., p. 30 (key to species).  
 1932. id., loc. cit., p. 447, and 609 (in key).  
 1935. id., *Pap. Tortugas Lab. Carneg. Inst.*, xxix (452), p. 338.  
 1936. Yamaguti, *Parasit. Copep. Japan*, pt. 3, pp. 13-18.  
 1940. Gnanamuthu, *Rec. Ind. Mus.*, xlv, p. 291.  
 1950. id., *Parasitology*, xl, p. 277.  
 1954. Deboutteville & Nunes-Ruivo, *Bull. Inst. franç. Afr. Noire*, xvi, pp. 141-58.  
 1954. Yamaguti, *Publ. Seto Mar. Biol. Lab. III*, 3, pp. 387 sqq.

♀—Head and 1st thoracic segment fused into a carapace with lateral margins curved down ventrally. 2nd-4th segments fused, covered by a single dorsal plate prolonged backwards over genital segment and abdomen; latter 1- (or 2-) segmented. Antenna 1 filiform, joints more or less fused. Antenna 2 and maxillipeds prehensile, unciniate. 1st and 2nd pairs of legs biramous but rudimentary; rami of 3rd and 4th pairs modified: each leg of the 3rd pair formed of fused inner and outer ramus, folded along middle (cross-section semi-circular), fleshy; rami of 4th legs elongate, extending backwards, fleshy. Ovisacs elongate, filiform, eggs uniseriate.

♂—Carapace with flat margins. 2nd-4th segments fused with genital segment, no dorsal plate. Abdomen 1-segmented, visible dorsally. 1st-3rd legs as in ♀, rami of each 4th leg fused, elongate, projecting backwards.

*Key to the South African species*

1. Ventral plate present.
2. Ventral plate absent.

*petersi*  
*paradoxus*

*Lernanthropus petersi* v. Ben.

Fig. 19.

1857. Van Beneden, *Bull. Ac. Roy. Belgique*, xxiv, n.s. I, pp. 51-63, pl.  
 1864. Nordmann, loc. cit., p. 510 (*Stalagnus p.*).  
 1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 472 (reference to van Beneden omitted).  
 1922. Wilson, loc. cit., p. 35 (in key).  
 1939. Brian, *Rev. Zool. Bot. Afr.*, xxxii, p. 183, fig. vi.

♀—A dorsal plate covering entire body, only rami of 3rd and 4th legs visible dorsally; posterior margin of plate pointed. A ventral plate similar to the dorsal plate, covering bases of 3rd and 4th legs but leaving genital segment and abdomen uncovered. (Characters from Wilson's 1922 key.)

10 mm.

*Localities.* Mozambique, on gills of *Serranus goliath* (= *Epinephelus fuscoguttatus*) (van Beneden); Belgian Congo, host unknown (Brian).

*Lernanthropus paradoxus* (Nordm.)

1832. Nordmann, *Mikrogr. Beitr.*, ii, p. 45 (*Epachthes p.*).  
 1833. Burmeister, *Act. Ac. Leop. Car. Nat. Cur.*, xvii, p. 307, pl. 14, fig. 12.

1840. Milne Edwards, *Hist. Nat. Crust*, iii, p. 499  
 1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 469.  
 1922. Wilson, loc. cit., pp. 22, 36, and 35 (in key).

♀—A dorsal plate covering entire body, only rami of 3rd and 4th legs visible, but no ventral plate. 3rd and 4th legs, genital segment, and abdomen entirely visible in ventral view. 3rd legs biramous. (Characters from Wilson's 1922 key.)

8.7 mm.

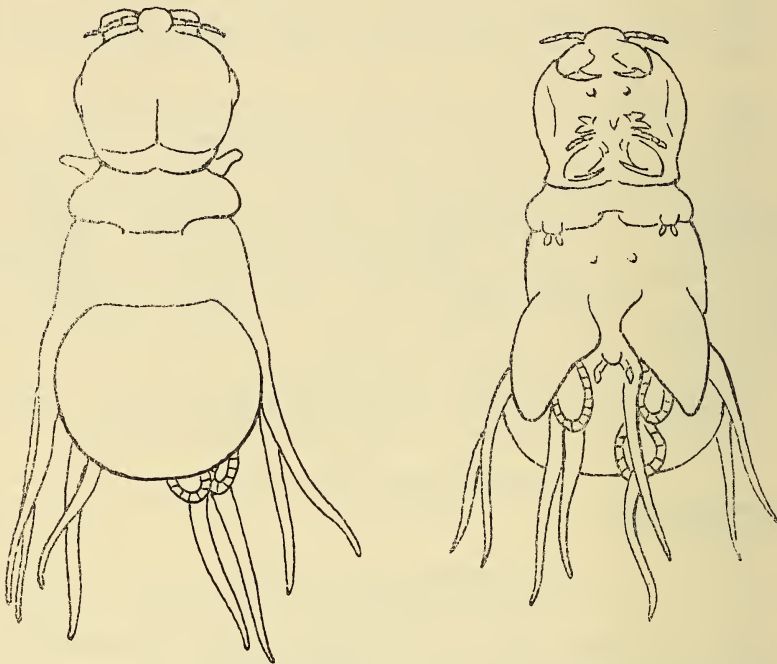


Fig. 19. *Lernanthropus petersi* van Ben. Dorsal and ventral views ♀ (copies from van Beneden; the ventral view shows the 2nd antennae turned downwards as in Brian's figure).

*Locality.* Cape of Good Hope, on *Mugil* sp.

*Remarks.* Wilson (1922, p. 36) says that Nordmann in his text referred to pl. 12, figs. 12-14, that no such plate was published, and that the only illustration of this species is that published by Burmeister.

#### Fam. EUDACTYLINIDAE

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19, 20 (*Dichelesthiidae* part, *Eudactylinae*).  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 452 (*Eudactylinidae*).

Gen. *Nemesis* Risso

1826. Risso, *Hist. Nat. Eur.*, v, p. 135.  
 1913. Wilson, *Proc. U.S. Nat. Mus.*, xlv, p. 236.  
 1922. id., loc. cit., p. 58 (references and key to 5 species) (characters of ♂ incorrectly stated).  
 1923. Fage, *Bull. Soc. Zool. Fr.*, xlviii, p. 282.  
 1932. Wilson, loc. cit., p. 460 (key to 3 species).

♀—Head and 1st thoracic segment fused. Carapace elliptical, longer than wide. 1st-3rd free segments wider than long, each covered with a dorsal plate whose sides curve round on to ventral surface; 4th free (= 5th) segment narrower than preceding segments; genital segment narrower than 4th. Abdomen narrow, 2-3-segmented; caudal rami tipped with spine-setae. Antenna 1 10-15-jointed. Antenna 2 unciniate. Maxillipeds large, unciniate. 4 pairs of biramous legs, rami of 1st pair differing from those of 2nd-4th; 5th pair rudimentary, uniramous. Ovisacs elongate, filiform, uniseriate. Spermatophores spherical, attached to genital segment.

♂—Similar, but narrower. Dorsal plates of 1st-3rd free segments not curved over ventrally to such an extent as in ♀; 4th free segment much shorter than 3rd; genital segment large. Abdomen 3- or 4-segmented; caudal rami larger than in ♀. 1st-4th pairs of legs larger, more strongly setose.

Gill-parasites on sharks.

*Nemesis pallida* Wilson

Fig. 20 a, b.

1932. Wilson, loc. cit., p. 464, pl. 30 b-p.  
 1935. id., *Pap. Tortugas Lab. Carn. Inst.*, xxix (452), p. 340.  
 1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 250.

♀—Carapace regularly oval, greatest width in centre. 1st free segment without notch on lateral margin; 4th free segment wider than long, but narrower than 3rd, hind margin evenly curved, sternal plate just visible laterally. Genital segment wider than long. Abdomen 3-segmented. Antenna 1 13-14-jointed. No trace of 5th pair of legs on the 4th free segment.

♂—Abdomen 4-segmented.

♀ 4.5 mm., ovisacs 7-8 mm., ♂ 4 mm. As preserved dirty yellowish-grey, ovisacs yellow, spermatophores dark maroon.

*Locality.* Table Bay, on gills of Thresher shark (*Alopias*) (S. Afr. Mus.).

*Distribution.* East coast of N. America.

*Remarks.* In general features these specimens correspond with Wilson's description, but the hind margin of the 5th (4th free) segment in ♀ cannot be described as 3-lobed.

## Fam. DICHELESTHIIDAE

1922. Wilson, *Proc. U.S. Nat. Mus.*, lx, 5, pp. 1, 19-21. (*Dichelesthidae*, part, *Dichelesthinae*.)  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 476. (*Dichelesthidae* restricted.)

*Lamproglena* Nordmann has the abdomen nearly as long as the trunk, obscurely 3-segmented. *L. monodi* Capart (1944. *Bull. Mus. Hist. Nat. Belg.*,

xx, 24, p. 8, fig. 2) occurs in the Belgian Congo on the fresh-water fishes *Serranochromis thumbergi* and various species of *Haplochromis*.

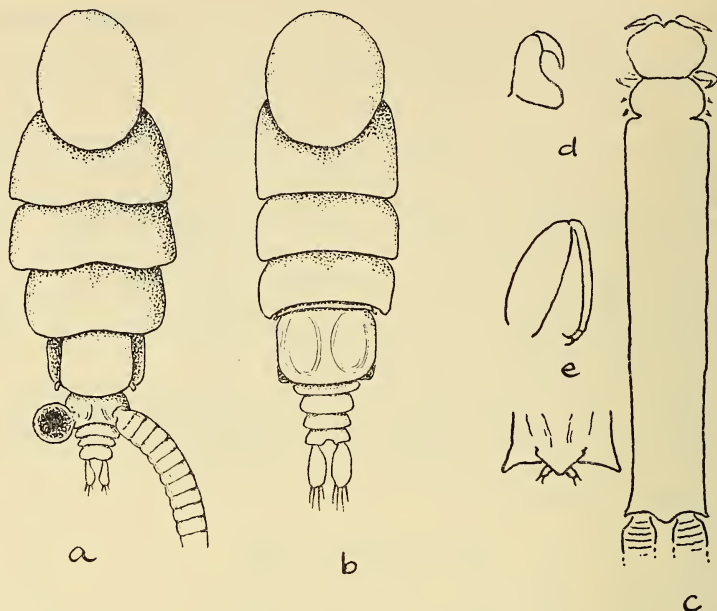


Fig. 20. *Nemesis pallida* Wilson. *a*, ♀, spermatophore shown on left, base of ovisac on right side; *b*, ♂. *Hatschekia acuta* Brnrd. *c*, ♀, with ventral view of abdomen; *d*, antenna 2; *e*, maxilliped.

#### Gen. *Hatschekia* Poche

1902. Poche, *Zool. Anz.*, xxvi, p. 16.  
 1913. Wilson, *Proc. U.S. Nat. Mus.*, xlv, p. 239.  
 1922. id., loc. cit., p. 81 (key to species).  
 1932. id., loc. cit., p. 476.  
 1939. Yamaguti, *Paras. Copep. Japan*, pt. 5, Caligoida 3, vol. *Jubil. Prof. Yoshida*, II, pp. 458-69.  
 1951. Pearse, *Proc. U.S. Nat. Mus.*, ci, p. 357.  
 1953. Yamaguti, *Publ. Seto. Mar. Biol. Lab.*, III, 2, p. 225.  
 1954. id., *ibid.*, III, 3 pp. 392 sqq.

♀—Head rounded or transversely oval. First 2 thoracic segments more or less free, but often fused, each with a pair of biramous legs. Remaining thoracic segments and genital segment forming a trunk, subcylindrical, more or less elongate, but sometimes elongate-ovate. Abdomen short, 1-segmented, or absent. Antenna 1 3-6-jointed, often indistinctly jointed. Antenna 2 stout, with apical claw. Maxilliped slender, uncinuate. Two pairs of biramous legs, sometimes rudiments of 3rd and 4th pairs. Ovisacs cylindrical, short or moderately long, eggs uniseriate.

♂—Head rounded, separated from the fused thoracic segments. Abdomen more or less distinct; caudal rami larger than in ♀. Antenna 1 longer and stouter than in ♀. Maxilliped very long, slender, projecting far beyond margin of head. Two pairs of biramous legs, rami 1-jointed.

Parasitic on gills of various Teleost fishes.

*Hatschekia acuta* Brnrd.

Fig. 20 c-e.

1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 250, fig. 7.

♀—Head transversely oval. First 2 thoracic segments completely fused, as wide as (or nearly) head; trunk cylindrical, about 6 times as long as wide, smooth, without indents or constrictions, postero-lateral corners acute. Antenna 1 obscurely 3- or 4-jointed. Ovisacs elongate.

4 mm., ovisacs 7-8 mm.

*Locality.* Fish Hoek, False Bay, on gills of *Brama raii* (coll. K.H.B. 1935).

*Remarks.* Appears to be distinguished from other species by the acute postero-lateral corners of the trunk, but in this respect resembles the Japanese *conifera* Yamaguti 1939, from the gills of *Stromateoides*.

Fam. LERNAEIDAE

1905. Stebbing, *Mar. Invest. S. Afr.*, iv, p. 116.

1917. Wilson, *Proc. U.S. Nat. Mus.*, liii, pp. 1-150, pls. 1-21 (revision of family).

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 479.

1933. Gurney, *Brit. FW. Copep.*, iii, p. 334 (restricted).

In 1917 Wilson admitted four subfamilies: *Lernaeinae*, *Lernaeenicinae* [*sic*], *Lernaeocerinae*, and *Pennellinae*; in 1932 the *Pennellinae* are given full family rank. Gurney included only the first subfamily in the family *Lernaeidae*.

*Life-history.* The Copepodid ♂♂ and ♀♀ infest the gills or fins of fishes, but the ♂♂ do not develop beyond the fourth Copepodid stage when they become sexually mature. The ♀♀, after fertilization, seek a second fish host, a species different from the first host, which is necessary for the maturing of the eggs.

The ♀♀ burrow into the second host until the head reaches the dorsal aorta or one of the main blood-vessels. Horns and variously shaped processes grow out from the head and fix the parasite in the tissues of the host; and a hard cyst forms around the head of the parasite.

Parasitic on various fishes, marine and fresh water.

*Key to the South African genera* (♀♀)

1. 2-4 soft horns symmetrically arranged on head. Ovisacs sack-like, eggs multi-seriate. Fresh water. *Lernaea*
2. Head with branched processes but no horns. Ovisacs filiform, eggs uniseriate. Marine. *Cardiodectes*

Gen. *Lernaea* Linn.

1758. Linnaeus, *Syst. Nat.*, 10th ed., p. 655.

1914. Cunnington, *Proc. Zool. Soc. Lond.*, ii, p. 819 (*Lernaeocera*).

1917. Wilson, loc. cit., p. 36.

1918. id., *Bull. Bureau Fish.*, xxxv, 1915-16, p. 163, pls. 6-15.  
 1920. id., *Bull. Amer. Mus. Nat. Hist.*, xliii, p. 5.  
 1925. Leigh-Sharpe, *Parasitol.*, xvii, p. 245.  
 1928. Wilson, *Swed. zool. Exp., White Nile*, pt. 5, no. 3, p. 13.  
 1932. Monod, *Ann. Parasitol.*, x, p. 345, and pp. 359, 378 (list of species and bibliography).  
 1933. Gurney, loc. cit., p. 336 (development).  
 1944. Capart, *Bull. Mus. Hist. Nat. Belg.*, xx, no. 24, p. 2.  
 1950. Harding, *Bull. Br. Mus. (N.H.)*, I, 1, pp. 3-27, figs. (key to species).

♀ (adult)—Head a rounded knob, behind which one or two pairs of horns, simple or forked, soft, conical. Neck soft, thin, gradually enlarging into trunk, which has a pregenital prominence in front of vulva. Abdomen short, blunt. A pair of maxillipeds as well as 2 pairs of maxillae. 4 pairs of biramous legs, and a 5th pair of 1-jointed stumps just in front of vulva. Ovisacs cylindrical or ovoid, eggs multiseriate.

Parasitic on fresh-water fishes. In Africa 8 species have been found on *Polypterus*, *Labeo*, *Barbus*, *Clarias*, *Distichodus*. In North America the Black-bass and Blue-gills are attacked.

Only one record actually from South Africa.

*Lernaea barbicola* Leigh-Sharpe

Fig. 21 a.

1930. Leigh-Sharpe, *Parasitol.*, xxii, p. 334, figs. 1-6.  
 1950. Harding, loc. cit., p. 23, fig. 89.

*Locality.* Transvaal, on the tail of a young *Barbus*. Length 7.2 mm.

The following species occur in Lake Tanganyika or Lake Nyasa, on *Polypterus*, *Bagrus*, *Clarias*, *Tilapia*, *Haplochromis*, etc., and may be found in Rhodesia or the Transvaal:

*haplocephala* (Cunn.), *diceracephala* (Cunn.), *bagri* Harding, *tilapiae* Harding, *barilii* Harding, *palati* Harding, *lopharia* Harding, *bistricornis* Harding, *tuberosa* Harding.

Gen. *Cardiodectes* Wilson

1917. Wilson, loc. cit., p. 50.  
 1928. Brian, *Boll. Mus. Zool. Univ. Genova*, viii, no. 26, p. 1.  
 1934. Leigh-Sharpe, *Siboga Exp. monogr.*, 29 b, p. 143.  
 1936. Markevitch, *Treubia*, xv, 4, p. 407.  
 1937. Stekhoven, *Mem. Mus. Hist. Nat. Belge*, ser. 2, fasc. 9, p. 13.  
 1953. Capart, *Bull. Inst. franc. Afr. Noire*, xv, p. 665.

♀ (adult)—Whole anterior surface of head covered with dichotomously branched ampulliform processes forming a more or less spherical mass, radiating chiefly from short horns which are continued along the lateral margins. Neck curved, trunk straight, abdomen hemispherical. 4 pairs of legs, the first two close together and biramous, 3rd pair uniramous, 4th pair without rami. Ovisacs straight, elongate, eggs uniseriate.



The parasite penetrates the isthmus and buries its head in the heart of the fish; but is sometimes attached to other parts of the body. Hosts: various species of *Scopelus* (*Myctophidae*), *Stolephorus* (*Engraulidae*), and *Apogon* (*Apogonidae*).

*C. frondosus* Stekhoven 1937 appears to be a synonym of *bellottii* (Richiardi) and *hardenbergi* Markev. 1936 a synonym of *rubosus* L.-S. 1934. But see: Capart, 1953.

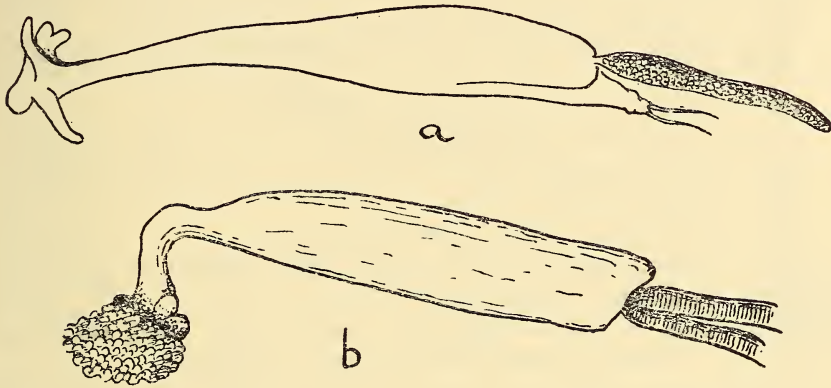


Fig. 21. *Lernaea barbicola* L.-S. a, ♀ (copy after Leigh-Sharpe). *Cardiodectes medusaeus* (Wilson); b, ♀.

*Cardiodectes medusaeus* (Wilson)

Fig. 21 b.

1908. Wilson, *Proc. U.S. Nat. Mus.*, xxxv, p. 458, pl. 76, figs. 99, 100 (*Lernaenicus m.*).  
 1912. Brian, *Res. Sci. Camp, Monaco*, fasc. 38, p. 27, pl. 10, figs. 1-5 (*Lernaenicus m.*).  
 1917. (May). Stebbing, *Ann. S. Afr. Mus.*, xvii, p. 42 (*Lernaenicus m.*)\*.  
 1917. (June). Wilson, loc. cit., p. 52, pl. 3, figs. 15-23.  
 1933. Pesta, *Zool. Anz.*, civ, p. 278, fig. (*Lernaenicus m.*).  
 1950. Kirtisinghe, *Parasitology*, xl, p. 84, figs. 36-9.

♀—Two pairs of horns, the anterior flattened, the posterior pair more or less lobate, covered with nodular processes forming a semiglobular mass resembling a mulberry. Ovisacs about twice as long as body.

Body (excluding curved portion within host) 5-8 mm., ovisacs 13-16 mm.

*Localities.* Off Saldanha Bay, on *Scopelus argenteus* Gilch. (= *hectoris* Gnthr.) (Stebbing); off Cape Peninsula and Cape Point, on *Myctophum hectoris* and *cocoi* (S. Afr. Mus.).

*Distribution.* Pacific coast of N. America, and off Japan; near Mauritius; Ceylon (on *Anchoviella*).

\* *Lernaenicus* is correct.

## Fam. PENNELLIDAE

1917. Wilson, *Proc. U.S. Nat. Mus.*, liii, p. 103 (*Lernaeidae* part, *Pennellinae*).  
 1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 489 (*Pennellidae*).

Gen. *Pennella* Oken

1815. Oken, *Lehrb. Nat.* (3), i, p. 358.  
 1877. Wierzejski, *Z. wiss. Zool.*, xxix, p. 562, pls. 32, 33 (larval stages).  
 1905. Stebbing, *Mar. Invest. S. Afr.*, iv, p. 117 (references).  
 1913. Quidor, *Deux. Exp. Antarct. Franc. Copep. Parasit.*, p. 197. (*Penella*, sic).  
 1917. Wilson, loc. cit., p. 105 (key to species).  
 1928. Leigh-Sharpe, *Parasitol.*, xx, p. 79.  
 1931. id., *ibid.*, xxiii, p. 109.  
 1932. Wilson, loc. cit., p. 489.  
 1932. Kirtisinghe, *Parasitol.*, xxiv, pp. 137, 548.  
 1938. Monod, *Bull. Trav. St. d'Aquic. Pêche Castiglione*, p. 3 (reprint).  
 1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 28.  
 1952. Rose & Hamon, *Bull. Soc. Hist. Nat. Afr. Nord*, xlv, p. 172. (*Pennella varians*, larval stages on Cephalopods)

♀ (adult)—Head more or less globular, truncated, with 2 or 3 horns, usually chitinous and usually unbranched. Neck long, cylindrical, passing insensibly into the trunk which is wider, straight, and transversely rugulose. Abdomen shorter than trunk, with a row of plumose appendages along each side, and a pair of minute caudal rami with long setae. Antennae dorsal; antenna 1 with few joints, antenna 2 chelate. Mouth-parts obsolete. First 2 pairs of legs biramous, close together, 3rd and 4th pairs uniramous, all rami 2-jointed, setose. Ovisacs filiform, several times the length of the body, eggs uniseriate.

Copepodid ♂—Head fused with 1st segment; 2nd, 3rd and 4th segments free and diminishing in width; 5th and genital segments fused. Abdomen one-segmented, caudal rami short, wide, setose. Antenna 1 indistinctly jointed. Antenna 2 2-jointed, with stout chela. Mandibles, 2 pairs of maxillae, and a pair of maxillipeds well developed. Swimming legs like those of ♀; 5th pair absent.

Adult ♀♀ are parasitic on Fishes (*Mola*, *Diodon*, *Lophius*, *Exocoetus*, *Thunnus*, *Germo*, *Naucrates*, *Remora*, *Xiphius*, *Histiophorus*, and *Tetrapturus*) and on Whales. *Pennella* is the only Copepod parasitic on Mammals.

Life-history. The larva is presumed to hatch as a typical Nauplius. At the first Copepodid stage (fig. 22 *g, h*) the larva attaches itself to the gills of Cephalopods. In subsequent stages the ♂♂ and ♀♀ mature and fertilization occurs. The ♀ then leaves the Cephalopod and seeks the second host, in which it buries its head, seeking one of the larger blood-vessels. A large cyst forms round the head of the parasite, and this becomes very hard and persists some time after the death of the parasite.

Young ♀♀ in the final stage have been described under the names *Baculus* Lubbock 1860 (*Tr. Linn. Soc. Lond.*, xxiii, p. 190, pl. 29, fig. 40) and *Hessella*

Brady 1883 (see *Challenger Rep.*, viii, p. 136, pl. 55, figs. 9-13; also Brian, 1912, loc. cit., *infra* pl. 6, fig. 10). These three figures represent successive stages leading to the adult ♀ form.

*Pennella filosa* (Linn.)

Fig. 22 *a, b*.

1758. Linnaeus, *Syst. Nat.*, p. 819 (*Pennatula f.*).  
 1905. Stebbing, loc. cit., p. 119 (as *orthagorisci*).  
 1912. Brian, *Res. Sci. Camp. Monaco*, fasc. xxxviii, p. 16, pl. 3, figs. 2-4, pl. 6, fig. 10.  
 1913. Quidor, loc. cit., pl. 1, figs. 5-8, pl. 4, figs. 35, 36.  
 1917. Wilson, loc. cit., p. 119, pl. 15, figs. 125-7, pl. 16, figs. 128-33, pl. 17, figs. 134-9.  
 1928. Leigh-Sharpe, loc. cit., p. 82, figs. 3, 7.  
 1932. Wilson, loc. cit., p. 490, fig. 295 *a, b*.  
 1954. Deboutteville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 215, figs. 7, 8.

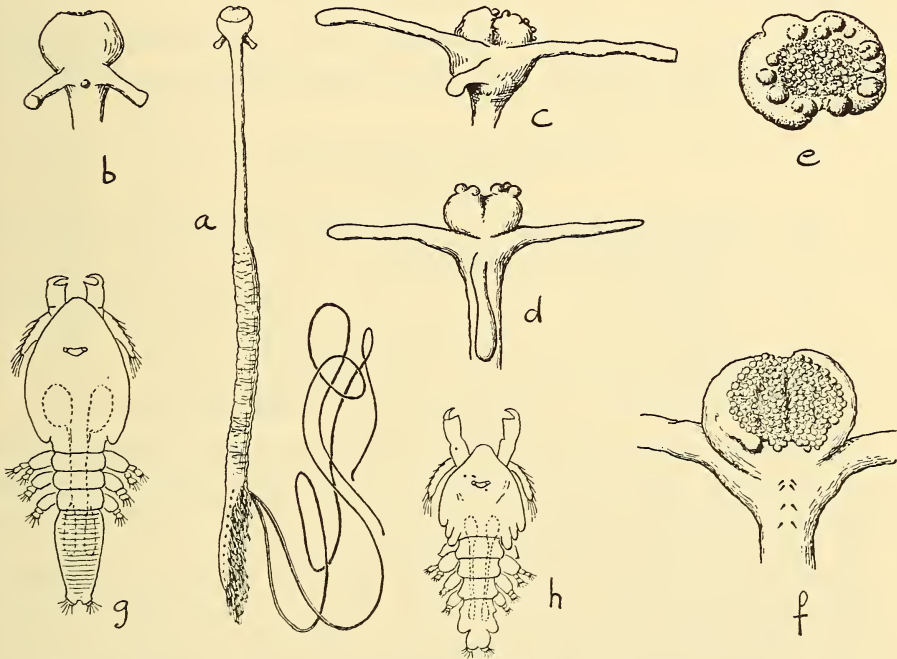


Fig. 22. *Pennella filosa* (Linn.). *a*, ♀; *b*, dorsal view of head ♀. *Pennella crassicornis* St. & L. *c, d*, two views, dorsal and slightly oblique, of head ♀; *e*, ventral (buccal) surface of head ♀. *Pennella balaenopterae* K. & D. *f*, ventral surface of head ♀. *Pennella varians* St. & L. *g, h*, Copepodid stage of ♀ and ♂ respectively (copy after Wilson, from Wierzejski).

♀—Two short stout horns projecting nearly at right angles to head, sometimes (more or less developed) a third horn medio-dorsal between the bases of the other two. Neck varying in length; trunk about twice as wide as neck.

Abdomen about half length of trunk, plumes branched. Ovisacs very slender, at least twice length of body.

One of the specimens in S. Afr. Mus.: trunk 50 mm., abdomen 23 mm., ovisac 280 mm. Neck pale yellowish, trunk and abdomen dark slaty brown.

*Locality.* Table Bay (Stebbing, and S. Afr. Mus.), on *Mola mola*.

*Distribution.* Atlantic, Mediterranean, east coast of N. America. Recorded also as parasitic on the Swordfish and Tunny.

*Pennella exocoeti* (Holten)

1802. Holten, *Skr. Naturh. Selsk.*, v, p. 136, pl. 3, fig. 3.  
 1913. Quidor, loc. cit., p. 205 (in key), pl. 1, fig. 3, pl. 4, fig. 39.  
 1913. id., *ibid.*, p. 209, pl. 1, fig. 1, pl. 2, fig. 26, pl. 3, fig. 28, pl. 4, fig. 37 (*liouvillei*).  
 1915. Calman, *West Indian Bull.*, xv, p. 120, pl.  
 1917. Wilson, loc. cit., p. 112 (in key), 115.  
 1928. Leigh-Sharpe, loc. cit., p. 83, fig. 4.  
 1954. Deboutteville & Nunes-Ruivo, *Bull. Inst. franc. Afr. Noire*, xvi, p. 163, fig. 16 a-g.

A small species, as one would expect from its host: Flying-fishes (*Exocoetus*). Quidor's specimen described as *liouvillei* measured about 37 mm. Not yet recorded from South African waters.

*Pennella crassicornis* St. & L.

Fig. 22 c-e.

1861. Steenstrup & Lütken, *K. Dansk. Videns. Selsk. Skr.* (5), v, p. 416, pl. 14, fig. 34 (on *Hyperoodon*).  
 1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 18, pl. 3, figs. 5-9 (on *Mola*).  
 1917. Wilson, loc. cit., p. 113 (in key to species).  
 1938. Monod, loc. cit., p. 3, fig. 1 (on *Xiphias*).  
 1954. Deboutteville & Nunes-Ruivo, *Vie et Milieu*, iv, p. 217, fig. 9.

In the South African Museum there are three specimens, consisting of head and neck only, taken from the belly of a Minke (Lesser Rorqual or Piked Whale) (*Balaenoptera acutorostrata*) stranded on the beach in Table Bay 1914. The neck of the longest specimen is 90 mm. in length.

They do not correspond with the figures given by Brian for the specimens which he assigned with a ? to *crassicornis*. But they are very like the figures given by Monod for two Algerian specimens. The medio-dorsal horn varies in length; in the specimen where it is longest it is somewhat bulbously enlarged in its distal half. Around the buccal surface of the head are several hard, blunt knobs varying in number and size in the 3 specimens; the central portion is filled with spongy tissue without such definite granules or nodules as seem to be indicated in Monod's figure. *P. liouvillei* Quidor (1913, loc. cit.) from a Flying-fish, as shown in pl. 2, fig. 26, appears to have a similar but more effusive growth of knobs on the buccal surface.

I have not seen the original description of *crassicornis*, and merely record these specimens as corresponding with Monod's specimens.

*Pennella orthagorisci* Wright

1917. Wilson, loc. cit., p. 124.  
 1924. id., *Proc. U.S. Nat. Mus.*, lxiv, p. 12.  
 1928. Leigh-Sharpe, loc. cit., p. 81, fig. 2.  
 1932. Wilson, loc. cit., p. 492, fig. 295 d.

Stebbing's 1905 description of the horns of his specimen corresponds with those of specimens from a *Mola* caught in Table Bay and received by the South African Museum in 1936. Wilson diagnoses Wright's species as having 2 (or 3) slender horns, longer than head and directed obliquely backwards; and abdomen  $\frac{1}{3}$ - $\frac{2}{3}$  length of trunk. Whether Wright's species can be maintained as distinct from *filosa* seems rather doubtful.

Hosts: *Mola mola*, *Germo alalonga*.

*Pennella balaenopterae* K. & D.

Fig. 22 f.

1877. Koren & Danielssen, *Fauna Littor. Norveg*, pt. 3, p. 157, pl. 16, figs. 1-9.  
 1905. Turner, *Tr. Roy. Soc. Edinb.*, xli, 2, p. 409, pls. 1-4 (anatomy).  
 1910. Quidor, *Bull. Mus. Paris*, p. 97.  
 1913. id., loc. cit., p. 205 (in key), pl. 1, fig. 14, pl. 4, fig. 32.  
 1913. id., *ibid.*, p. 206, pl. 1, figs. 15-18, pl. 4, figs. 29, 34 (*antarctica*).  
 1917. Wilson, loc. cit., p. 116, pl. 15, figs. 119-24 (*antarctica*), and pp. 112, 113 (in key).  
 1928. Leigh-Sharpe, loc. cit., p. 86, fig. 6.  
 1939. Legendre, *Bull. Soc. zool. Fr.*, lxiv, p. 312 (comparison with *germonia*).  
 1944. Brian, *An. Mus. Argentino*, xli, p. 215.

In the South African Museum are two specimens from whales taken at Saldanha Bay, and one from a Fin Whale stranded in False Bay. The latter has no head, and a specimen of the barnacle *Conchoderma virgatum* is firmly fixed over the vulva. The thorax measures 65 mm. and the abdomen 40 mm.

The measurements of the former two specimens are: neck 170 and 130 mm., thorax 42 and 40 mm., abdomen 30 and 25 mm., respectively. The ovisacs are 180 mm. in the one, and the single sac in the other 350 mm. long.

Although Wilson keeps *antarctica* as a separate species, there seems every likelihood that with further study all Quidor's species, about which he himself (loc. cit., p. 204) was somewhat diffident, viz.: *antarctica*, *charcoti*, *anthonyi* and *cettei*, are forms of *balaenopterae*.

Mathews (1938. *Discovery Rep.*, xvii, p. 126) records *Penella* [*sic*] on a Sperm Whale caught at Durban, and (*ibid.*, p. 238) on South African examples of Sei-whales; but the parasite is rare.

## LERNEOPODOIDA

1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 141 (*Lernaeoidea* part).  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 492, and 613 (key to genera).  
 1945. Gurney, *Ann. Mag. Nat. Hist.* (xi), 12, p. 121 (remarks on classification).  
 1947. id., *J. Mar. Biol. Assoc.*, xxvii, 1, p. 133 (remarks on classification).

Body usually without movable articulations, often without any trace of segmentation. Sexes very dissimilar, the male a pygmy clinging to the female, which is immovably attached to the host. Antenna 2 small, but sometimes prehensile. Maxillae 2 in ♀ often modified into 'arms', separate or fused at their tips, or completely fused, with a 'bulla' for attachment. During development the maxillipeds sometimes migrate from their normal position until they lie between or even in advance of the bases of maxillae 2. Eggs in the two ovisacs multiseriate (extracted from Wilson).

*Key to the South African genera (♀♀ only)*

- I. Parasitic on fishes.
- A. Body more or less elongate. Parasite attached to host by antennae 2, maxillae 2, or maxillipeds, or by combination of two or more of these appendages.
1. Antenna 2 prehensile. Maxilla 2 non-prehensile.
    - a. Head and trunk with paired lateral processes. *Chondracanthus*
    - b. No lateral processes on head; only one pair at hind corners of genital segment. *Acanthochondria*
  2. Antenna 2 non-prehensile. 2nd maxillae usually fused, at least at their tips, with apical bulla for attachment.
    - a. Maxillipeds between bases of 2nd maxillae, both close to mouth; 2nd maxillae longer than head, which is more or less in line with trunk or bent forwards.
      - i. Trunk without processes. Abdomen distinct. Fresh water. *Achtheres*
      - ii. Trunk with 2 posterior processes ventral to the ovisacs. No abdomen. *Lerneopoda*
    - b. Maxillipeds close to mouth, 2nd maxillae far removed. Head more or less in line with trunk or bent backwards.
      - i. 2nd maxillae short, fused.
        - a. Antenna 1 3-jointed; antenna 2 uniramous. *Clavella*
        - β. Antenna 1 4-jointed; antenna 2 biramous. *Clavellopsis*
      - ii. 2nd maxillae short, separate, fused only (if at all) at tips, with bulla.
        - a. Tips of 2nd maxillae not lobate. Antenna 1 3-jointed. *Eubrachiella*
        - β. Tips of 2nd maxillae lobate. Antenna 1 4-jointed. *Parabrachiella*
      - iii. 2nd maxillae long, separate, but fused at their tips, or tips enlarged.
        - a. Bulla small. *Brachiella*
        - β. Bulla large (or tips of 2nd maxillae enlarged or branched). *Charopinus*
- B. Head and (wholly or in part) neck buried in host.
1. Genital segment with 2 short posterior processes. *Medesicaste*
  2. Genital segment with long, digitate posterior processes. *Strabax*
  3. Genital segment with 2 profusely branched posterior processes. *Sphyron*
- II. Parasitic on Crustacea. Body spherical, attached by 2nd maxillae and maxillipeds. *Sphaeronella*

## Fam. CHONDRACANTHIDAE

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 488 (part).  
 1930. Oakley, *Parasitology*, xxii, pp. 182 sqq.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 493 (no definition).  
 1951. Deboutteville, *Arch. Zool. exp. gen.*, lxxxvii, notes no. 4, p. 139 (classification).

*Remarks.* The *Zoological Record* (lxvii, 1930, Crust., p. 41) lists *Chondracanthoides* [*sic* = *odes*] and *Chondracanthopsis* as new genera 'ex Wilson MS'. Oakley (loc. cit., p. 182) says: 'The descriptions of *Chondracanthodes* and *Chondracanthopsis* were communicated to me in manuscript by Wilson.' He proceeds, however (p. 196), to give as genotype of the latter *C. nodosus* Müller 1779. As this is a well-known species the Rules of Nomenclature are satisfied, and the genus must be credited to Oakley, although a full generic description was not given until 1932 by Wilson.

For the other 'n.g.' on the other hand, Oakley gave as genotype an undescribed species 'deflexus'. Both genus and species were first described by Wilson in 1932. The result is thus:

*Chondracanthopsis* Oakley 1930, genotype *C. nodosus* (Müller) 1779.

*Chondracanthodes* Wilson 1932, genotype *C. deflexus* Wilson 1932.

Gen. *Chondracanthus* De la Roche

1811. De la Roche, *N. Bull. Sci. Soc. Philom. Paris*, 2 (44), p. 270.  
 1899. Bassett-Smith, loc. cit., p. 491 (part).  
 1922. Wilson, *Ark. Zool.*, xiv, 10, pp. 8-12.  
 1930. Oakley, loc. cit., p. 186 (genotype: *zei* de la Roche).  
 1932. Wilson, loc. cit., p. 497.  
 1939. Yamaguti, *Paras. Copep. Japan*, pt. 6 (vol. *Jub. Prof. Yoshida*, II), pp. 531-3.  
 1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 30.

♀—Head separated from thorax by a more or less constricted neck, with barb-like process at each hind corner. First two thoracic segments more or less free; other segments fused with genital segment, with paired processes. Abdomen very small, without caudal rami. Antenna 2 prehensile. Two pairs of fleshy biramous legs. Ovisacs multiseriate.

♂—Head large, more or less fused with thorax. Caudal rami present. Antenna 2 strongly prehensile. Mandibles and maxillipeds falcate. Two pairs of uniramous legs.

*Key to the South African species*

- |  |                   |
|--|-------------------|
| 1. Without dorsal processes.               | <i>merluccii</i>  |
| 2. With medio-dorsal crest-like processes. |                   |
| a. Head longer than wide.                  | <i>lophii</i>     |
| b. Head circular.                          | <i>congiopodi</i> |

*Chondracanthus merluccii* (Holten)

Fig. 23 a, b.

1802. Holten, *Skr. Natur. Selsk.*, v, 2, p. 135, pl. 3, fig. 2.  
 1899. Bassett-Smith, loc. cit., p. 494.  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 180, pl. 20, fig. 10 (♂), pl. 47, fig. 8 (♀), pl. 53, figs. 16-19.  
 ?1923. Wilson, *Ark. Zool.*, xv, 3, p. 14. (*Chondracanthus* sp. nova 1 ♀.)  
 1923. id., *Medd. Goteb. Mus. zool. Avd.*, no. 19 (*Goteb. Vet. Handl.* (4) xxv, 6), p. 10, pl. 1, fig. 13 (♂), pl. 2, figs. 14, 15 (♀) (*stramineus*).  
 1930. Oakley, loc. cit., p. 188, fig. 2.  
 1932. Wilson, loc. cit., p. 498, fig. 298 and pl. 1, fig. a.  
 1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 865, pl. 2, figs. 7-9 (anatomy).  
 1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 251.

♀—Head wider behind than in front, and gibbous dorsally, a small projection at postero-lateral corner. Thoracic segment with antero-lateral

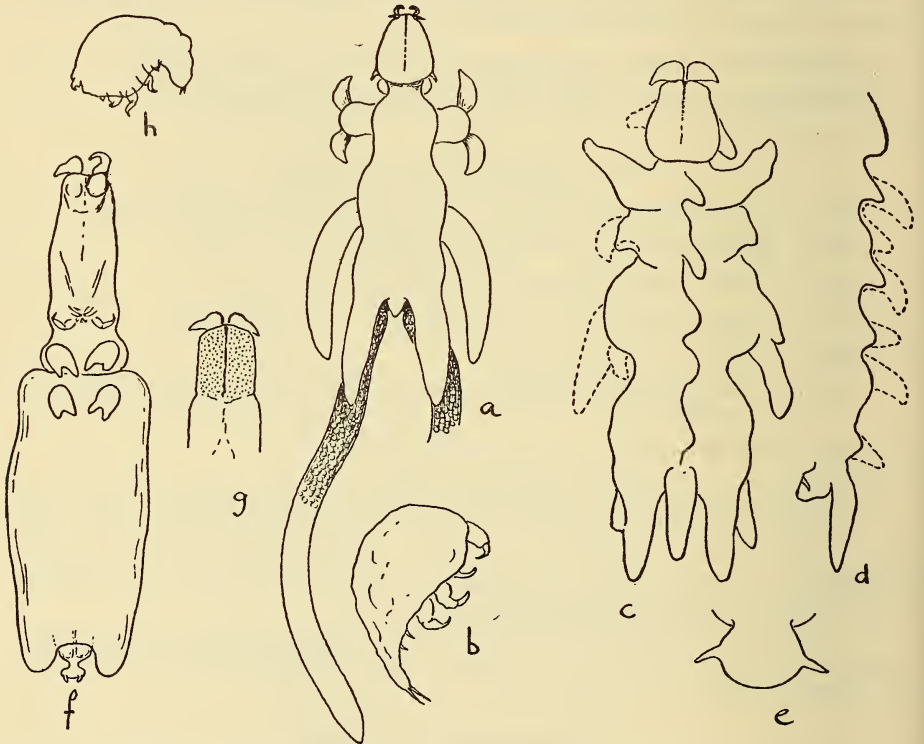


Fig. 23. *Chondracanthus merluccii* (Holten). a, dorsal view ♀; b, ♂. *Chondracanthus lophii* Johnston. c, dorsal view ♀; d, dorsal profile ♀; e, ventral view of abdomen ♀. In c and d the dotted lines indicate the differences in a Plymouth specimen and the Cape specimens. *Acanthochondria lepidionis* n. sp. f, ventral view ♀, left antenna 1 and right antenna 2 removed; g, dorsal view of head ♀; h, ♂.



corners slightly prominent. Genital segment with a pair of long processes anteriorly, a ventral median knob, and hind corners produced. Abdomen small. Basal joint of antenna 1 large.

♂—Head much inflated dorsally. Attached to ♀ near vulva.

♀ up to 12 mm., ovisacs 14 mm., ♂ 0.6 mm.

*Localities.* Agulhas Bank, on *Merluccius capensis*, 1 ♀ with ♂ (Wilson); Table Bay, on gills and floor of mouth of the Stockfish, *M. capensis* (S. Afr. Mus., ♀♀, ♂♂).

*Distribution.* Europe, east coast of N. America.

*Remarks.* In *Ark. Zool.* 1923 Wilson records a single ♀ taken in Table Bay on *Gadus* [sic.] *capensis* by Dr. Holub in 1894, and says: '... apparently the same species as one obtained . . . from . . . *Merluccius bilinearis*, on the New England coast. It is a new species . . . and will soon be published.' I have not been able to trace this advertised description; but as Wilson has recorded *C. merluccii* from *M. bilinearis* in 1932, it would appear that he revised his opinion and decided it was not a new species.

Wilson's second 1923 record refers to a single ♀ collected by Skoog in 1912 on the Agulhas Bank. There seems no reason for regarding it as distinct from *merluccii*.

#### *Chondracanthus lophii* Johnston

Fig. 23 c-e.

1836. Johnston, *Loud. Mag. Nat. Hist.*, p. 181, fig. 16.

1862. Turner & Wilson, *Trans. Roy. Soc. Edinb.*, xxiii, p. 67, pl. 3.

1899. Bassett-Smith, loc. cit., p. 494 (references).

1913. Scott, T. & A., loc. cit., p. 179, pl. 52, fig. 4 (♀), pl. 56, figs. 16-18.

1927. Goggio, *Publ. Staz. zool. Napoli*, viii, pp. 427 sqq., figs.

1930. Oakley, loc. cit., p. 187, fig. 1, B.C.D.

1948. Barnard, loc. cit., p. 251.

♀—Head longer than wide, with a lateral projection near hind corner. Thoracic segment indistinctly bisegmented, with 2 lateral processes, the hinder one (in Cape specimens) rounded, scarcely developed; a pair of bifid ventral processes (legs). Genital segment constricted in middle, anterior portion with an obscurely bifid lateral process, posterior portion with two (dorsal and ventral) postero-lateral processes. Abdomen small, dorsally concealed by a more or less elongate process. A mid-dorsal crest with more or less developed processes on thoracic and genital segments. Antenna 1 obscurely jointed, strongly expanded at base. Ovisacs curved or twisted.

10-12 mm.

*Locality.* Agulhas Bank, on *Lophius piscatorius* (♀♀ S. Afr. Mus.).

*Distribution.* British Seas.

*Remarks.* In comparison with a Plymouth specimen certain differences in the development of the lateral processes and dorsal crest were found, which are indicated in fig. 23 c, d.

The ovisacs break up, and the nauplii hatch within a few hours (Sproston, 1942. *J. Mar. Biol. Assoc. Plymouth*, xxv, p. 442).

*Chondracanthus congiopodi* n. sp.

Fig. 24.

♀—Cephalothorax subcircular, gibbous posteriorly on dorsal surface, 'barbs' large, lobate. Trunk unsegmented, but with 4 lateral processes separated by deep indents, 4 medio-dorsal knobs, a pair of posterior processes extending beyond abdomen. Antenna 1 fusiform, 2-jointed. Two pairs of uniramous fleshy legs, ovate or more or less boot-shaped, the 'toe' pointing medianwards. Ovisacs shorter than body, stout.

♀ 5 mm., ovisac 3 mm., ♂ 0.6 mm.

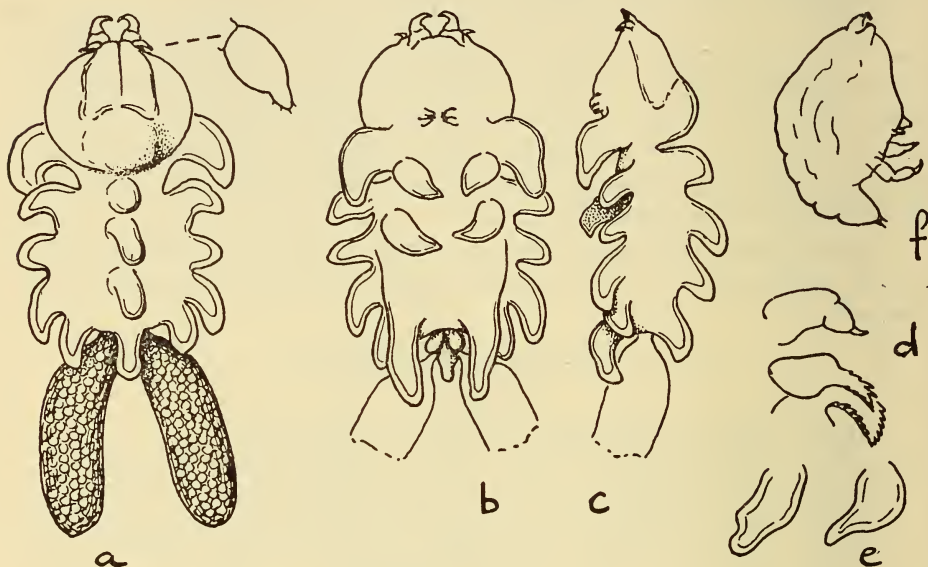


Fig. 24. *Chondracanthus congiopodi* n. sp. a, dorsal view ♀, with antenna 1 further enlarged; b, ventral view ♀; c, lateral view ♀; d, maxilla, maxilliped and mandible ♀; e, variations in shape of leg ♀; f, ♂.

*Locality.* Table Bay, on gills of Horse-fish (*Congiopodus torvus*). (S. Afr. Mus. ♀♀, ♂♂.)

*Remarks.* Although the legs are not definitely bifid, there seems no reason why this species should not be included in *Chondracanthus*.

Gen. *Acanthochondria* Oakley

1927. Oakley, *Parasitology*, xix, p. 466 (genotype: *cornuta* O. F. Müller).  
 1930. id., *ibid.*, xxii, p. 189.  
 1932. Yu & Wu, *Bull. Fan. Mem. Inst.*, III, 4, pp. 57-71 (*Chondracanthus* spp.)  
 1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 861, pl. 1 (anatomy).  
 1939. Yamaguti, *Paras. Copep. Japan*, pt. 6, vol. *Jub. Prof. Yoshida*, II, pp. 533-41.  
 1940. Heegaard, *Vid. Medd. Dansk nat. For.*, civ, p. 87.  
 1944. id., *ibid.*, cvii, p. 33.

♀—Head separated from thorax, without barb-like processes. First 2 thoracic segments free; other segments fused with genital segment. No dorsal or ventral processes except a pair at posterior corners of genital segment. Abdomen very small, no caudal rami. Antenna 2 prehensile. Two pairs of uniramous or feebly biramous legs.

*Acanthochondria lepidionis* n. sp.

Fig. 23 *f-h*.

♀—Cephalothorax subcylindrical, very slightly widening posteriorly, where there is a slight constriction between it and the following thoracic segment. Head dorsally indicated by a slightly more strongly chitinized brown area, with a darker brown median line. A constriction between 2nd and 3rd thoracic segments, the latter completely fused with genital segment, its identity marked only by the position of the 2nd pair of legs. Genital segment longer than rest of body, and wider; posterior corners rounded, shortly produced. Abdomen very small, wider than long, with 2 small acute processes (? degenerate caudal rami). Antenna 1 expanded basally. Two pairs of small rudimentary bifid legs.

♀ 4-4.5 mm., ♂ 0.5 mm.

*Locality.* Off Cape Point, 300 fathoms, on gills of *Lepidion capense*.

*Remarks.* Resembling *longicephalus* Yu & Wu, and *pingi* Yu & Wu in the long cephalothorax; the latter species has the posterior corners of the genital segment conically produced.

Fam. LERNEOPODIDAE

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, pp. 565 sqq.

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 509 and (in key) 613 sqq.

The importance of the male in delimiting the genera has long been recognized and Wilson has very usefully brought together illustrations of 17 generic types of male on plates 25-28 of his 1915 revision of the family.

Gen. *Achtheres* Nordmann

1832. Nordmann, *Mikr. Beitr. wirbell. Th.*, ii, p. 63.

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 617.

1933. Gurney, *Brit. FW. Copep.*, iii, p. 359.

♀—Trunk without posterior processes. Abdomen distinct.

♂—Cephalothorax in line with body-axis, smaller than the segmented trunk.

*Remarks.* This genus contains species parasitic on the gills of fresh-water fishes, mostly North American. As one species is found on the Small-mouth Black Bass *Micropterus dolomieu*, which has been imported into South Africa, the genus is included here; it is possible that the parasite has been imported with the fishes.

*Achtheres micropteri* Wright

Fig. 25

1882. Wright, *Proc. Canad. Inst.*, n.s., i, p. 249, pl. 2, figs. 1-11.

1915. Wilson, loc. cit., p. 620, pl. 34, figs. 64-7, pl. 35, figs. 68, 69.

♀ 4-4.5 mm.

Gen. *Lerneopoda* Blainv.

1822. Blainville, *J. de Phys.*, xcv, p. 442.  
 1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 631 (*Lernaepoda*).  
 1918. Leigh-Sharpe, *Parasitology*, xi, p. 256.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 617, 619 (in key) (*Lernaepoda*).  
 1939. Yamaguti, loc. cit., p. 549 (*Lernaepoda*).

♀—Cephalothorax more or less inclined to axis of trunk, with dorsal carapace; one or two thoracic segments distinct. Trunk ovoid with a cylindrical

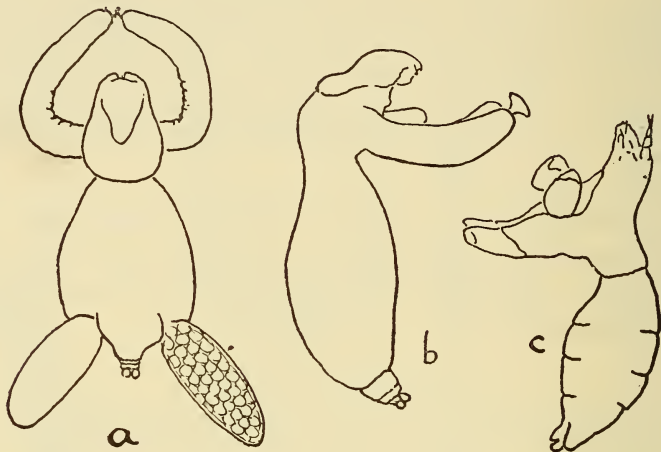


Fig. 25. *Achtheres micropteri* Wright. *a, b*, dorsal and lateral views ♀; *c*, ♂ (copies after Wilson).

or foliaceous posterior process on either side of the minute genital process *ventral* to the ovisacs; no anal lamellae. Antenna 1 4-jointed. Maxillipeds inside the 2nd maxillae, both close to mouth; 2nd maxillae long, separate, tips joined and enlarged into a disc or with a bulla.

♂—Unusually large (2–3.5 mm.). Cephalothorax in line with trunk, with a dorsal carapace, and separated by a groove from the unsegmented trunk; anal lamellae enlarged, turned forwards dorsally. Antenna 1 4-jointed. Antenna 2 apically chelate.

*Remarks.* The ventral position of the posterior processes separates the genus from *Lerneopodina* Wilson 1915.

*Lerneopoda galei* Kröyer

Fig. 26 *a, b*.

1837. Kröyer, *Naturh. Tidsskr.*, i, p. 272, pl. 3, fig. 5 *a-f*.  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 197, pl. 60, figs. 4–6, pl. 68, figs. 9–15, pl. 63, fig. 1 (♀ ♂).  
 1915. Wilson, loc. cit., p. 635.  
 1923. Monod, *Bull. Inst. ocean. Monaco*, no. 427, p. 5, figs 1*a* (♀ ♂), 2.

♀—Trunk obovate, dorso-ventrally flattened; posterior processes cylindrical. 2nd maxillae nearly or quite as long as trunk, with apical bulla. Ovisacs typically rather slender and about as long as total length.

♀ (trunk) 7–10 mm., 2nd maxillae 4–5 mm., ♂ 2·15 mm. (Wilson).

Locality. Kalk Bay (False Bay), in cloaca of *Mustelus laevis* (S. Afr. Mus. 1 ♀).

Distribution. British Seas.

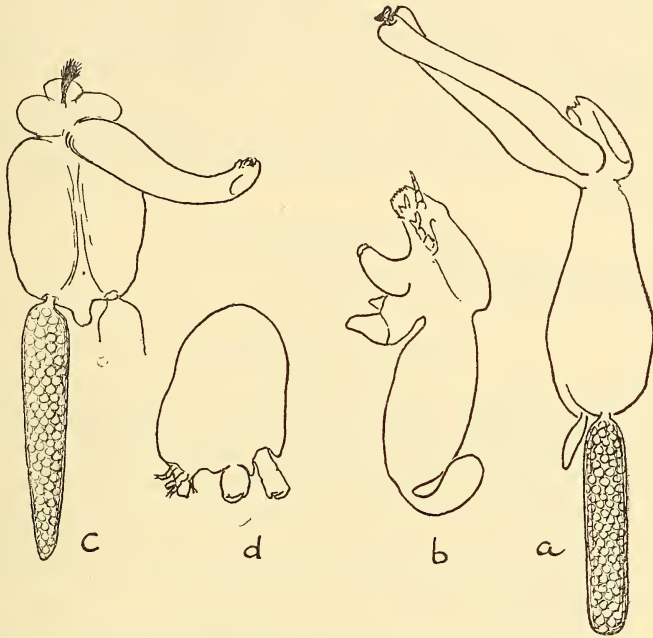


Fig. 26. *Lerneopoda galei* Kröyer. a, ♀; b, ♂ of *L. bidiscalis* (redrawn from Wilson after Kane). *Clavella pagelli* (Kröyer). c, ♀; d, ♂.

Remarks. In the present specimen the ovisacs are rather stout and not quite as long as trunk, but may not be fully developed.

The ♂ here figured belongs to another species, but shows the generic characters.

#### Gen. *Clavella* Oken

- 1815. Oken, *Lehrb. Nat.* (3), i, p. 358.
- 1822. Blainville, *J. de Phys.*, xcv, p. 438 (*Lernaemyzon*).
- 1832. Nordmann, *Mikr. Beitr. wirbell. Th.*, 2, p. 53. (*Anchorella*, non Cuvier).
- 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 561 (*Lernaemyzon*).
- 1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 666 (key to species).
- 1918. Leigh-Sharpe, *Parasitology*, xi, p. 118.
- 1920. id., *J. Mar. Biol. Assoc. Plymouth*, n.s., xii, p. 332 (excretory system).

1925. id., *Parasitology*, xvii, p. 194 (revision of British species).  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, p. 513.  
 1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 857 (*uncinata*, anatomy).  
 1934. Gurney, *ibid.*, 1934, 2, pp. 196, sqq. (*uncinata*, development).  
 1939. Yamaguti, *loc. cit.*, pp. 553-6.  
 1939. Poulsen, *Vid. Medd. Dansk naturf. Foren.*, cii, p. 223 (*uncinata*, biology).

♀—Cephalothorax long, bent backwards at an angle with axis of trunk, with or without dorsal carapace. Trunk ovoid, without posterior processes, abdomen, or anal lamellae; an unpaired genital process often present. Antenna 1 3-jointed. Antenna 2 uniramous. 2nd maxillae fused, usually short, sometimes absent.

♂—Cephalothorax and trunk folded together, forming an unsegmented ovoid mass, hind end rounded, not projecting below bases of 2nd maxillae. Antenna 1 2-jointed. Antenna 2 uniramous, 3-jointed. Maxilla 1 bipartite. No anal lamellae.

*Key to the South African species*

- |  |                 |
|--|-----------------|
| 1. Cephalothorax ♀ distinctly longer than trunk. | <i>pagelli</i>  |
| 2. Cephalothorax ♀ about same length as trunk.   | <i>denticis</i> |

*Clavella pagelli* (Kröyer)

Fig. 26 c, d.

1863. Kröyer, *Naturh. Tidsskr.* (3), ii, p. 295, pl. 16, fig. 3 (*Anchorella p.*).  
 1865. Heller, '*Novara*' *Crust.*, p. 242, pl. 24, fig. 6 (*A. canthari*).  
 1910. Stebbing, *loc. cit.*, p. 526 (*Leerneomyzon p.*).  
 1913. Scott, T. & A., *Brit. Parasit. Copep.*, p. 224, pl. 69, figs. 1-3 (*canthari*).  
 1915. Wilson, *loc. cit.*, pp. 668, 669, and 671, 672 (in key) (*canthari* and *pagelli*).  
 1924. Brian, *Parasitol. Maur.*, p. 52 (*Clavellodes c.*).

♀—Cephalothorax distinctly longer than trunk, curved backwards, with dorsal carapace, expanded into 2 lobes where it joins the trunk. Trunk ovoid, usually longer than wide and width usually greater than dorso-ventral depth, but sometimes subspherical, a small knob-like genital process. 2nd maxillae very short, fused, forming a lobe between the lobes of the cephalothorax, with a clavate bulla ending in a brush of minute bristles. Ovisacs about as long as cephalothorax, cylindrical, slightly tapering distally.

♂—See figure 26 d. Dorso-ventral depth greater than 'head to tail' length.  
 ♀ cephalothorax 3-4 mm., trunk 2 mm., ovisacs 3 mm., ♂ (major diameter) 0.5 mm.

*Locality.* Cape: on *Cantharus bleekeri* (sic., now *Pachymetopon blochi*) (Heller); on gills of White Steenbras (*Pagellus lithognathus*) (S. Afr. Mus. several ♀♀ and ♂♂).

*Distribution.* European seas, on *Cantharus* and *Pagellus*.

*Remarks.* T. & A. Scott include *pagelli* Kröy. with a ?, and adopt Heller's specific name. Wilson keeps the two separate in his rather unsatisfactory key.

There would seem to be little doubt that *canthari* is a synonym of *pagelli*. Among the present lot those specimens with subspherical trunk have the ovisacs shorter and more distinctly tapering than the others.

*Clavella denticis* (Kröyer)

1863. Kröyer, loc. cit., p. 296, pl. 16, fig. 4 (*Anchorella d.*).  
 1865. Heller, loc. cit., p. 243.  
 1910. Stebbing, loc. cit., p. 562 (*Lerneomyzon d.*).  
 1915. Wilson, loc. cit., pp. 668, and (in key) 672.

♀—(Characters from Wilson's key.) Cephalothorax slender, linear, about same length as trunk; latter ovoid, considerably longer than wide, narrowed anteriorly, posteriorly truncate. Genital process present. Ovisacs thick, ellipsoidal. 2nd maxillae?

*Locality.* Cape, on *Dentex rupestris* (Heller).

*Distribution.* European seas.

Gen. *Clavellopsis* Wilson

1915. Wilson *Proc. U.S. Nat. Mus.*, xlvii, p. 686 (key to species).  
 1939. Yamaguti, loc. cit., pp. 556-62.  
 1950. Kirtisinghe, *Parasitology*, xl, p. 84.

♀—Cephalothorax usually shorter and thicker than in *Clavella*. Trunk squat, often wider than long, sometimes with posterior processes, but no abdomen or anal lamellae; an unpaired genital process present. Antenna 1 4-jointed. Antenna 2 biramous, endopod 1-jointed, exopod 2-jointed. 2nd maxillae short, broad, fused, with folds of skin or swellings, with apical bulla.

♂—Cephalothorax and trunk at right angles, latter strongly arched dorsally, unsegmented, hind end projecting below bases of 2nd maxillae. Antenna 1 3-jointed. Antenna 2 biramous, each ramus 1-jointed. 1st maxillae tripartite.

*Remarks.* Differs from *Clavella* in general body form, 1st and 2nd antennae, 2nd maxillae in ♀, and 1st maxillae in ♂.

Wilson (p. 688) gives a reference to his own original description of *Clavella robusta*; but the paper is not quoted in his bibliography (p. 721), and seems to have been omitted from the *Zoological Record*.

*Key to the South African species*

- |  |                 |
|--|-----------------|
| 1. No posterior processes.                       | <i>fallax</i>   |
| 2. Two dorsal and 2 ventral posterior processes. | <i>hostilis</i> |

*Clavellopsis fallax* (Heller)

Fig. 27 a-c.

1865. Heller, '*Novara*', *Crust.*, p. 241, pl. 24, figs. 4, 5.  
 1924. Brian, '*Parasit. Mauri.*', p. 53.  
 1943. Heegaard, *Ark. Zool.*, xxxiv, A 18, p. 32, figs. 88-94.

♀—Cephalothorax longer than trunk, with dorsal carapace, and a lobe on either side at junction with trunk. Trunk dorso-ventrally flattened, broader than long, front and hind angles rounded, genital process about  $\frac{1}{4}$ – $\frac{1}{3}$  length of trunk. 2nd maxillae short, fused, lobulate, bulla mushroom-shaped. Ovisacs stout, cylindrical, apically rounded.

♂—Dorso-ventral depth about equal to 'head to tail' length.

♀—Cephalothorax 2.5, trunk 1.5 × 2, ovisacs 2.5–3.5 mm.; ♂ 1 mm.

*Localities.* On gills of White Steenbras (*Pagellus lithognathus*) (loc. unrecorded); East London, in mouth of *Pagrus nasutus*. (S. Afr. Mus, ♀♀, ♂♂.)

*Distribution.* Mediterranean, on *Dentex vulgaris*.

*Remarks.* Kurz (1877. *Zeitschr. Wiss. Zool.*, xxix, p. 393, pl. 25, figs. 5, 6, 29, 51, 52) has described *C. sargi* which, according to Wilson's key (loc. cit., p. 687), differs in having a cylindrical genital process  $\frac{1}{3}$  length of trunk instead

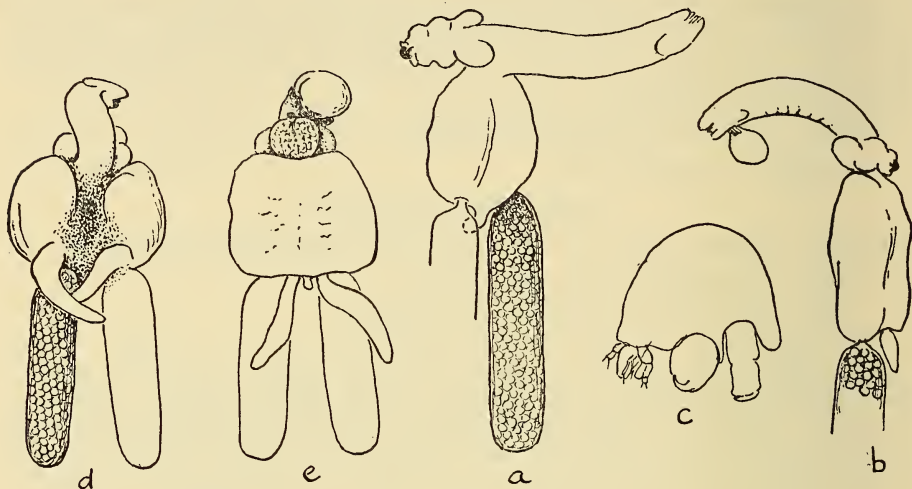


Fig. 27. *Clavellopsis fallax* (Heller). *a*, ♀ from *Pagellus*; *b*, ♀ from *Pagrus*, with ♂ attached to head; *c*, ♂. *Clavellopsis hostilis* (Heller), *d*, *e*, dorsal and ventral views ♀.

of a minute one, and smooth instead of wrinkled 2nd maxillae. Yamaguti (loc. cit., 1939, p. 556, pl. 48, figs. 144-148) records *sargi* from Japanese Sparid fishes.

In the South African specimens from *Pagellus* the thoracic and maxillary lobes vary in distinctness; and the genital process in the specimens from *Pagrus* is larger and more pointed than in those from *Pagellus*.

*Clavellopsis hostilis* (Heller)

Fig. 27 *d e*.

1865. Heller, '*Novara*' *Crust.*, p. 243, pl. 24, figs. 7, 7 *a*.

1915. Wilson, loc. cit., pp. 669 and (in key) 702 (? *Brachiella*).

1924. Brian, '*Parasitol. Mauri*', p. 51 (*Clavella h.*).

♀—Cephalothorax curved ventrally, about as long as trunk. Head without carapace. Trunk broader than long, tumid, with dorsal median concavity; 2 dorsal and 2 ventral posterior processes, of about equal length, the 2 dorsal ones far apart, the 2 ventral ones approximate; a small genital process. Antenna 1 4-jointed. Antenna 2 biramous. 2nd maxillae short, entirely fused, wrinkled, with small bulla. Ovisacs stout, apically rounded.



Cephalothorax and trunk each 1.25 mm., width of trunk 2 mm., ovisac 2.5 mm.

*Locality.* Natal, on gill-rakers of *Umbrina robinsoni* (S. Afr. Mus. 1 ♀).

*Distribution.* Mediterranean, on *Umbrina cirrhosa* (Heller).

*Remarks.* The present specimen appears to belong to *Clavellopsis* (1st and 2nd antennae), and is certainly very similar to Heller's species. No ♂ is present, and Heller had no ♂; and as Wilson remarks the ♂ is necessary for an exact generic determination. Wilson's suggestion to transfer Heller's species to *Brachiella* seems rather a strange one.

*C. appendiculata* Kirtisinghe 1950, on *Chirocentrus*, has similar posterior processes.

#### Gen. *Charopinus* Kröyer

1864. Kröyer, *Naturh. Tidsskr.*, (3), ii, p. 361. (*Nomencl. Preuss. Ak.*, gives date 1863; Marschall, and Neave give 1864.)  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 188.  
 1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 652 (key to species).  
 1928. Leigh-Sharpe, *Parasitology*, xx, p. 276.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 511 and (in key) 617, 619.  
 1939. Yamaguti, loc. cit., p. 552.  
 1946. Capart, *Bull. Mus. Hist. Nat. Belg.*, xxii, no. 10, pp. 1-6, figs.

♀—Cephalothorax elongate, often flexed backwards, head usually without carapace. Trunk swollen, pear-shaped, flattened dorso-ventrally, with a pair of posterior processes dorsal to the ovisacs; no genital process, abdomen or anal lamellae. Ovisacs long, cylindrical. Antenna 1 indistinctly 4-jointed. Antenna 2 biramous. 2nd maxillae elongate, either fused at their tips with a bulla of varying shape, or each one apically enlarged into a chitinous bar, or knob, or processes.

♂—Cephalothorax separated by a constriction from the trunk, which is segmented, with anal lamellae. Antenna 1 indistinctly 4-jointed. Antenna 2 biramous.

*Remarks.* Distinguished from *Brachiella* by the (usually) more elongate 2nd maxillae in ♀, and the segmented ♂.

T. & A. Scott (loc. cit., pp. 190, 191) describe the posterior processes as situated 'ventrally', and on pl. 55, figs. 1 and 5 label ventral view as 'dorsal'.

Parasitic in the nasal passages or spiracles, or on the gills, of sharks and skates.

#### *Charopinus dubius* T. Scott

Fig. 28

1900. Scott, T., 18th *Ann. Rep. Fish. Board Scotl.*, p. 130, pl. 7, fig. 15.  
 1913. Scott, T. & A., loc. cit., p. 190, pl. 55, fig. 5.  
 1915. Wilson, loc. cit., p. 654 (in key).

♀—Cephalothorax slightly shorter than trunk, which is dorso-ventrally flattened, pear-shaped in dorsal view, concave dorsally; posterior processes slightly shorter than trunk. Maxilliped with very small apical spine instead of a

claw (cf. Wilson, 1915. loc. cit., pl. 41, fig. 113. *Brianella corniger*). 2nd maxillae longer than trunk, firmly joined at their tips to a large boat-shaped chitinous plate.

Cephalothorax 5 mm., trunk 6 mm., width 5 mm., posterior process 5 mm., 2nd maxillae 7 mm., ovisacs 9–10 mm.

*Locality.* Port Elizabeth, on a skate (1 ♀ sent by Dr. van Hille, Rhodes University, 1948).

*Distribution.* Scotland.

*Remarks.* The ♂ of this species is unknown.

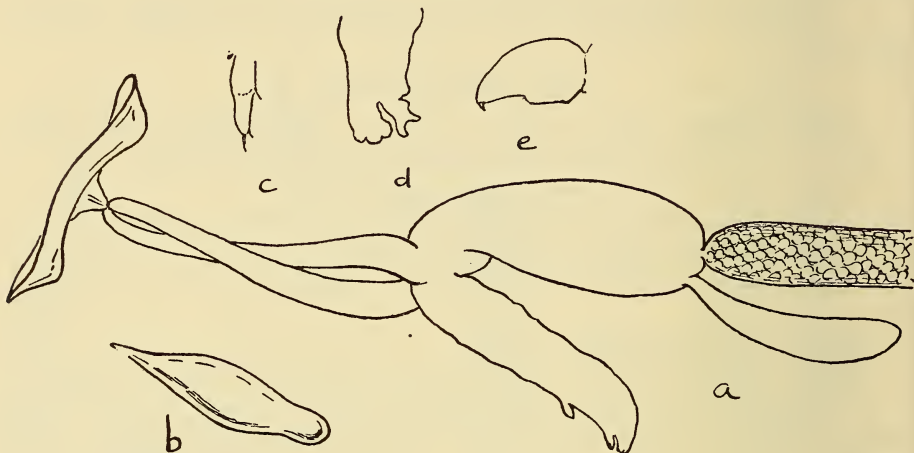


Fig. 28. *Charopinus dubius* T. Scott. a, ♀; b, end view of bulla; c, antenna 1; d, antenna 2; e, maxilliped.

#### Gen *Brachiella* Cuvier

1830. Cuvier, *Règne Anim.*, ed. 2, iii, p. 257.  
 1905. Miculicich, *Zool. Anz.*, xxviii, pp. 599 sqq.  
 1913. Scott, T. & A., *Brit. Paras. Copep.*, p. 203.  
 1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 698 (key to species).  
 1928. Leigh-Sharpe, *Parasitology*, xx, p. 25.  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 520 and (in key) 618, 619.  
 1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 873, figs. (*merluccii* and *obesa*, anatomy).  
 1939. Yamaguti, loc. cit., p. 566.  
 1951. Gnanamuthu, *Spolia Zeylan*, xxvi, 1, p. 13.

♀—Cephalothorax elongate, more or less flexed backwards, head with dorsal carapace. Trunk swollen, flattened dorso-ventrally, with rows of pits, grooves, or knobs on dorsal and ventral surfaces in some species; 2 or 4 posterior processes and an unpaired genital process, no abdomen or anal lamellae. Ovisacs long, slender. Antenna 1 2-4-jointed (usually 3). Antenna 2 biramous. 2nd maxillae long, usually separate and joined at tips by a bulla, but sometimes fused.

♂—Cephalothorax separated by a constriction from trunk. Trunk fusiform, narrower than cephalothorax, unsegmented, with small anal lamellae. Antenna 1 3-jointed. Antenna 2 biramous, both rami 1-jointed.

*Remarks.* Wilson (1915, p. 700) refers to *B. lophii* M. Edw. 1840, and says it had not been seen by other investigators. Evidently he had overlooked the

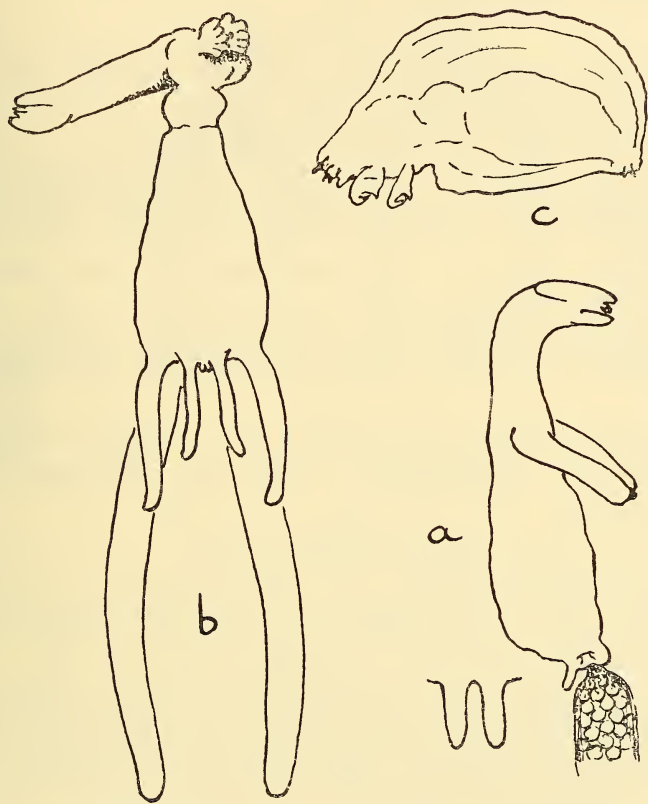


Fig. 29. *Brachiella* sp. a, lateral view of ♀ with dorsal view of posterior processes further enlarged. *Parabrachiella australis* Wilson. b, ♀; c, ♂.

record of T. & A. Scott (1913) who placed the species in *Clavella*. Moreover Wilson in his key (1915, p. 702) characterizes *lophii* as having pear-shaped 'posterior processes'; reference to Milne Edwards's description and figure, however, indicates that these are the ovisacs.

#### *Key to the South African species*

1. Two posterior processes; genital process short.
2. Four posterior processes; genital process long.

B. sp.?  
*macrura*

*Brachiella* sp.

Fig. 29 a.

Two ♀♀, without ♂♂, from the axil of the pectoral fin of *Mugil capito*, Table Bay, are not in good condition.

Head with carapace. Trunk longer than wide, with 2 short digitiform posterior processes and a small rounded genital process. 2nd maxillae separate, joined at tips, with minute bulla.

Cephalothorax 1.5 mm., trunk 1.5 mm.

*Brachiella macrura* Wilson

1920. Wilson, *Bull. Amer. Mus. N.H.*, xliii, p. 7, pl. 3, figs. 23-8.

1939. Brian, *Rev. Zool. Bot. Afr.*, xxxii, p. 196.

1953. Capart, *Bull. Inst. franç. Afr. Noire*, xv, p. 669.

♀—Trunk longer than wide; 2 dorsal and 2 ventral posterior processes of about equal length; genital process long, about half length of posterior processes. 2nd maxillae fused at base, then separate to the bulla. Ovisacs slender, elongate.

Cephalothorax, trunk, and posterior processes each about 4 mm., trunk width 2 mm., ovisacs 9 mm.

*Localities.* Mouth of Congo R., on gills of Snapper (*Neomaenis fulgens*) (Wilson); mouth of Congo R. (Brian): Senegal and Togo, on *Otolithus* (Capart).

*Remarks.* Brian considers that this should be a synonym of *chevreuxii* van Beneden 1891 (on an Elasmobranch); Capart, with some hesitation, maintains the two species.

Gen. *Parabrachiella* Wilson

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 713.

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 519 and (in key) 618, 619.

1933. Saby, *Proc. Zool. Soc. Lond.*, 1933, 4, p. 867, figs. (*insidiosa*, anatomy).

1945. Ringuelet, *Notas Mus. la Plata, zool.*, x, no. 86, p. 129.

♀—Large size. Cephalothorax separated from trunk by a distinct groove. Trunk cylindrical, without pits or grooves, with 1 or 2 pairs of posterior processes, and a minute genital process; no abdomen or anal lamellae. Antenna 1 4-jointed. Antenna 2 biramous, exopod 2-jointed. 1st maxillae bi- or tripartite. 2nd maxillae short, united only at their tips which are lobate, with small bulla.

♂—Body without trace of segmentation, no carapace, trunk swollen dorsally. A pair of small caudal rami. Antenna 1 3-jointed.

*Remarks.* Distinguished from *Brachiella* by the groove separating cephalothorax and trunk in ♀, and the unsegmented and unstricted body in ♀.

*Parabrachiella australis* Wilson

Fig. 29 b, c.

1923. Wilson, *Medd. Goteb. Mus. zool. Avd.*, no. 19 (*Goteb. Vet. Handl.* (4), xxv, 6), p. 8, pl. 2, figs. 16-23 (♀ ♂).

♀—Trunk with 2 pairs of posterior processes, and a minute genital process. 2nd maxillae short, tips expanded like a hand, with 5 digitate or lobate processes (more or less separate), bulla attached to the 'palms'.

♀ trunk 6 mm., including processes 9 mm., ♂ 3 mm.

*Localities.* Cape Barracouda, on gills of Stockfish (*Merluccius capensis*) (Wilson); no locality, on gills of Stockfish (S. Afr. Mus. 1 ♀, 1 ♂).

*Remarks.* Closely allied to *insidiososa* (Heller 1865, 'Novara', Crust., p. 239, pl. 24, fig. 1), which is parasitic on *Merluccius vulgaris* in Europe.

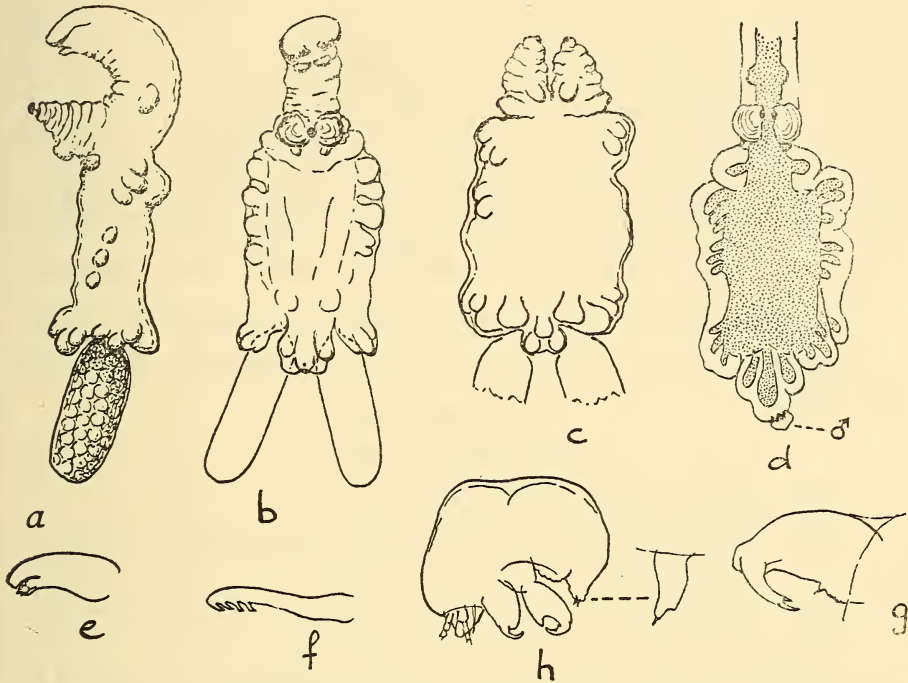


Fig. 30. *Eubrachiella sublobulata* n. sp. *a, b*, lateral and ventral views adult ♀; *c*, another specimen ♀ to show knobs at base of 2nd maxillae; *d*, juvenile ♀, with ♂ attached, to show subcuticular lobes; *e*, antenna 2; *f*, mandible; *g*, maxilliped; *h*, ♂ with caudal ramus further enlarged.

#### Gen. *Eubrachiella* Wilson

1915. Wilson, *Proc. U.S. Nat. Mus.*, xlvii, p. 716.

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, pp. 618, 619 (in key).

♀—Cephalothorax about as long as trunk, more or less flexed ventrally, no (distinct) dorsal carapace. Trunk stout, short, separated from cephalothorax by a groove, no (distinct external) processes. Ovisacs stout. Antenna 1 3-jointed. Antenna 2 biramous. 1st maxillae tripartite. 2nd maxillae short, stout, separate throughout their length, or united at tips by a bulla.

♂—Cephalothorax separated from trunk by a constriction, trunk posteriorly bent forwards. Antenna 1 3-jointed. Antenna 2 uniramous.

*Remarks.* This genus was established by Wilson to contain the two Antarctic species *antarctica* Quidor 1906, and *gainii* Quidor 1912. The present specimens, found on the subantarctic genus *Congiopodus*, appear to be congeneric.

*Eubrachiella sublobulata* n. sp.

Fig. 30.

♀—Cephalothorax thick, straight in juvenile, curved ventrally in ovigerous specimens, carapace indicated anteriorly, a lateral rounded protuberance (not very prominent) in front of 2nd maxillae. Trunk broad, but longer than wide, dorso-ventrally flattened; a medio-dorsal bifid knob at junction with cephalothorax and a medio-dorsal bifid knob (or two processes adnate at their base) on hind margin; both these bifid projections arise from the internal tissues, and each pair is united into a single knob by the external cuticle; similar lateral knobs covered by the cuticle along the sides, usually in groups of three: antero-laterally, laterally, dorso-laterally and ventro-laterally at the hind corners; a medio-ventral trifid knob on hind margin; no two specimens are exactly alike. Antenna 1 3-jointed. Antenna 2 biramous. 1st maxillae tripartite. 2nd maxillae short, stout, wrinkled, separate at base but united at tips, with a bulla; a knob on each ventrally, and another knob-like process at their bases projecting laterally; the latter appear to belong to the cephalothorax, but may belong to the trunk region (see fig. *d*, juvenile). Ovisacs short, stout.

♂—Body gibbous, with distinct constriction between cephalothorax and trunk.

♀ cephalothorax (if straightened) about 1.5 mm., trunk 1.5–2.5, ♂ 1 mm.

*Locality.* Table Bay, on gills of Horse Fish (*Congiopodus torvus*) (S. Afr. Mus. ♀♀, ♂♂).

## INCERTAE SEDIS

Gen. *Medesicaste* Kröyer

1863. Kröyer, *Naturh. Tidsskr.* (3), 2, p. 386.  
 1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 489.  
 1927. Oakley in Leigh-Sharpe & Oakley, *Parasitology*, xix, p. 464 (new definition).  
 1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 495 and (in key) 614, 616.

♀—Head and neck cruciform, bulla on anterior part of head. Neck long and thin, enlarged at base. Body dorso-ventrally flattened, longer than broad, marked with faint transverse and longitudinal grooves. Thoracic appendages absent. Posterior processes convergent, enclosing a small 1-segmented abdomen. Ovisacs cylindrical.

♂—Very similar to ♂♂ of *Chondracanthus*. Antennal area marked off by a definite constriction.

*Remarks.* The above diagnosis is after Oakley (1927). He says that the general resemblance of the ♀ to that of the *Sphyriidae* is striking, and 'but for the shape of the posterior part of the genital segment of ♀, and the general characteristics of the ♂, it would be extremely tempting to remove it to that family'. Earlier in the same paper (pp. 457, 458) Leigh-Sharpe remarked about Heller's species *Medesicaste capense* [*sic*]: '. . . from the figure bears a striking resemblance to a *Rebelula* which has lost its posterior processes. . . . In particular the Copepod bears a strong resemblance to *Rebelula bowieri* (Quidor) as described and figured by Wilson 1919 [*Proc. U.S. Nat. Mus.*, lv, p. 579, pl. 53, figs. 34-40, pl. 54, figs. 41-44]. One of Heller's figures of the ♀, however, indicates articulated appendages as well as knobs, and his figure of

the ♂, though little like those of the *Chondracanthidae*, is even less like those of the *Sphyriidae*.<sup>7</sup> He proposes (p. 459) that *M. penetrans* should be provisionally regarded as a synonym of *Rebelula bouvieri*.

The resemblance to *R. bouvieri* seems to be exaggerated; the ♂ and incomplete ♂ specimens described below confirm the validity of Heller's species and show that it cannot possibly be regarded as a *Rebelula*.

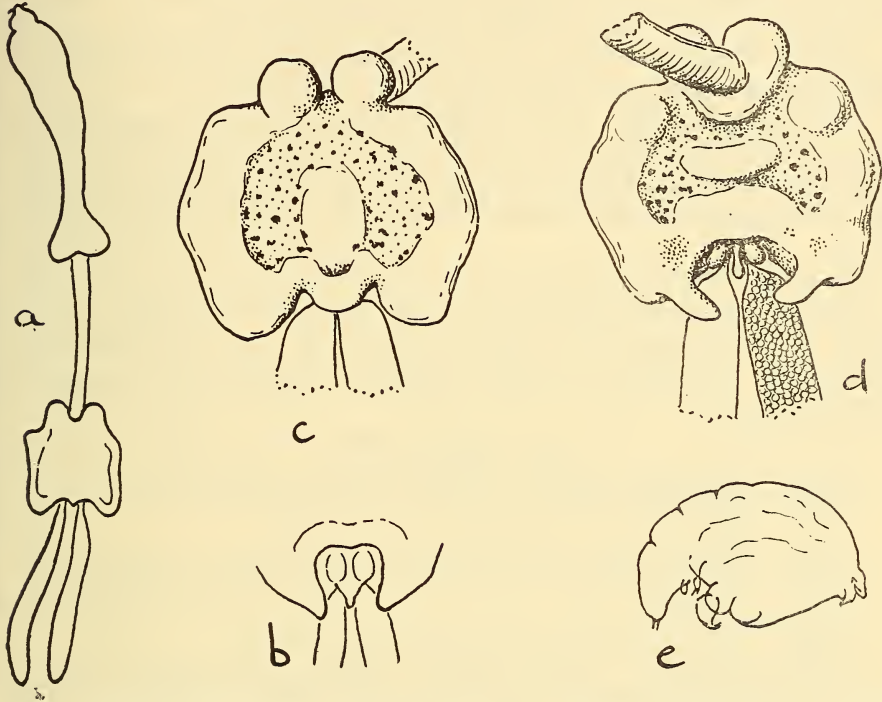


Fig. 31. *Medesicaste penetrans* Heller. *a*, whole animal ♀; *b*, ventral view of abdomen; *c*, *d*, dorsal and ventral views of genital segment ♀ (S. Afr. Mus. specimen); *e*, ♂ (*a* and *b* copies from Heller).

*Medesicaste penetrans* Heller

Fig. 31.

1865. Heller, 'Novara', *Crust.*, p. 235, pl. 25, figs. 1, 2.

1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 560.

♀—(description after Heller). Head transversely ovate, separated by a constriction from the elongate cylindrical thorax which is bilobately expanded posteriorly; followed by a more slender elongate neck. Genital segment quadrangular, bilobed anteriorly and posteriorly; abdomen small.

(S. Afr. Mus. specimen.) The neck is broken off shortly before the genital segment. The latter approximately as broad as long; and more rounded-quadrate than Heller's figure; 2 knob-like anterior processes dorsally, continued ventrally into a collar-like thickening around base of neck. The hind margin is trilobate, the larger broadly rounded lateral lobes each with a narrower process ventrally. The short and slender 1-segmented abdomen is

concealed in dorsal view. The dorsal and ventral surfaces of the genital segment show a number of pits between the smooth swollen margins and the central area.

The ♂, attached ventrally at base of abdomen, closely resembles Heller's figure.

Heller: ♀ 28 mm., ♂ 0.5 mm. S. Afr. Mus. specimen: ♀ genital segment 4.5 × 4.5 mm., ovisacs 6.5 mm., ♂ 0.75 mm.

*Locality.* Cape, on *Trigla capensis* (Heller): Kalk Bay, in mouth of Gurnard (*Trigla*) 1903. (S. Afr. Mus. 1 mutilated ♀ with attached ♂.)

*Remarks.* There would seem to be no doubt that this specimen is referable to Heller's species; both were found at the Cape on gurnards.

The only other species is *M. triglarum* Kröyer, which was regarded as a synonym of *asellinum* (Linn.) by Scott (1913). Oakley, however, (loc. cit.) resurrected *Lernentoma* Baird for the latter species, keeping *triglarum* in *Medesicaste*, and defined the differences between these two genera and *Oralien* Bassett-Smith.

The shape of the cephalothorax of the present species can scarcely be called cruciform; and the genital segment shows no lateral indentations as are shown in Oakley's figure of *M. triglarum* (loc. cit., fig. 7 C). These differences, however, are not important enough to require the removal of *M. penetrans* to another genus.

#### Gen. *Strabax* Nordm.

1864. Nordmann, *Bull. Soc. Imp. Nat. Moscow*, xxxvii, p. 477.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 490.

1912. Brian, *Res. Sci. Camp. Monaco*, fasc. 38, p. 33.

1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 615, 616 (in key to genera).

1948. Barnard, *Ann. Mag. Nat. Hist.* (12), i, p. 251.

♀—Body divided into 3 distinct regions. Cephalothorax enlarged, more or less transverse to the neck-like trunk, with 6 fleshy knobs, 2 anterior, 2 ventral and 2 posterior, head small. Trunk cylindrical; genital segment transverse with large digitiform processes. Abdomen obsolete (unless the median dorsal process be regarded as the abdomen). Antennae and mouth-parts reduced in adult. Legs absent. Ovisacs cylindrical, multiseriate.

♂—Pygmy. Cephalothorax inflated, hinder part of body segmented. Caudal rami setiform. Antenna 1 4-5-jointed; antenna 2 prehensile. Mouth-parts see *infra*. Two (or three) pairs of minute 2-jointed, uniramous legs.

*Remarks.* The hammer-like cephalothorax, neck, and expanded genital segment with pits on dorsal surface (as in *Rebelula* and *Periplexus*) afford points of similarity with the *Sphyriidae*. In fact it is rather surprising to find that *Strabax* cannot be included in this latter family.

Oakley (1930. *Parasitology*, xxii, p. 185) considered that Wilson (1917, p. 34) intended to transfer this genus to the *Sphyriidae* but was deterred by the Chondracanthine ♂. As so few undamaged specimens were known, Oakley thought best to leave it in the *Chondracanthidae*, while recognizing the extreme doubtfulness of its position.



Wilson's key (1932) is very misleading. Of the four alternative methods of fastening to the host given in sect. 1 (loc. cit., p. 613), the present genus falls under the second (head and neck buried in tissues of host), which leads to sect. 60 and the Sphyriid genera.

As regards the processes of the genital segment, Bassett-Smith and Wilson (neither of whom presumably examined an actual specimen) state that there are eight; Brian (loc. cit., pl. 8, fig. 8) shows 9, the two ventral ones being bifurcate, and calls them all 'faisceaux abdominaux'. Bassett-Smith says 'abdomen pyriform  $\frac{1}{3}$  as long as processes'. The present specimen, however, leads to the conclusion that all these processes arise from the genital segment and that the abdomen is so reduced as to be obsolete. If this be so, there are 5 dorsal processes, and 2 ventral bifurcate ones, i.e. counting the tips 9 in all in the present specimen, but 11 in Brian's figure. This raises the question whether Brian's specimen represents a different species, or whether the artist has perhaps shown too many processes.

Brian gives figures of the ♂ and its appendages. The present specimen does not fully correspond with his figures. Both antennae and the appendage labelled by Brian 'pmx 1' correspond in general, but that labelled 'pmx 2' is different, and I find no trace of the jointed appendage labelled 'p 1' (loc. cit., pl. 5, figs. 4 and 5). I have not seen Nordmann's paper, but Brian says the original description is incomplete, especially as regards the antennae and mouth-parts. Herein lies another possibility that the present specimen may correspond with the genotype, and Brian's specimen represent a different species.

A further point concerns the nomenclature of the ♂ appendages. Brian gives figures labelled mx, pmx 1, pmx 2, p 1, p 2, p 3. Omitting the jointed appendage p 1, which I do not find in my specimen, the stout appendage with bifid unguis (pmx 1) is presumably the 2nd maxilla, and the 2- or 3-jointed appendage (pmx 2) with falcate unguis in my specimen is the maxilliped.

One may also refer to the discrepancy in Wilson (loc. cit.). His fig. 298 e, pl. 38, fig. f, and pl. 39, fig. e all represent appendages similar in structure (2nd joint with a patch of spinules below unguis); the first is labelled '2nd maxilla', the second 'maxilla', and the third 'maxilliped'; and the descriptions of the first two do not correspond with their figures.

Very few specimens have been recorded, and a search for more material would be useful. All the recorded specimens are from Scorpaenid fishes.

*Strabax monstrosus* Nordm.

Fig. 32.

1864. Nordmann, loc. cit., p. 18 (*vide* Brian), pl. 5, figs. 1-10.  
 1912. Brian, loc. cit., p. 33, pl. 5, figs. 4, 5 (♂), pl. 8, figs. 7, 8 (♀).  
 1948. Barnard, loc. cit., p. 253, fig. 8 (♀ ♂).  
 1954. Nunes-Ruivo. *Vie et Milieu*, suppl. 3, p. 118, figs. 2 (♀), 3 (♂).

♀—Cephalothorax obliquely transverse to neck. The latter shows 4 pairs of pale longitudinal lines due to internal muscle strands; the posterior portion is

bent and shows 2 or 3 transverse grooves, none of which completely encircle the neck and do not represent segments. Genital segment dorsally with 3 pairs of pits. Digitiform processes slightly constricted near the bluntly rounded tips.

♂ attached ventrally near the vulva between the ventral bifurcate processes. 4 chitinous dorsal patches on posterior segments. Antenna 1 5-jointed; antenna 2 stout, prehensile. Maxilla 2 (?) stout, unguis with tooth on outer margin. Maxilliped 2-jointed, slender, with apical curved unguis. 1st and 2nd legs very small, 2-jointed, tipped with 2 setae; 3rd leg minute.

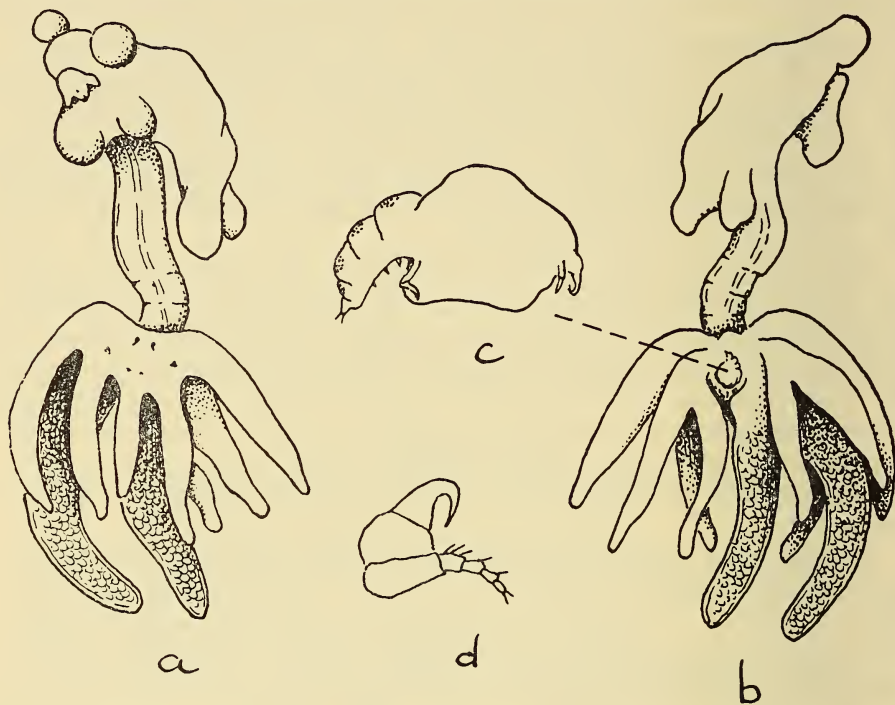


Fig. 32. *Strabax monstrosus* Nordm. a, b, dorsal and ventral views ♀, the latter showing attached ♂; c, ♂; d, 1st and 2nd antennae ♂.

♀ 'hammer' about 5 mm., neck 4 mm., processes 3-4 mm., ovisacs 5 mm.; ♂ 0.9 mm. Hammer and neck dark grey, the knobs pale, processes dirty buff, ovisacs yellow.

*Locality.* Port St. Johns, hammer embedded in the upper corner of the gill chamber of *Scorpaenodes guamensis*.

*Distribution.* Mediterranean and off north-west coast of Africa. On gills and palate of *Scorpaena porcus* and *scrofa*, and *Sebastes*.

#### Fam. SPHYRIIDAE

1919. Wilson, *Proc. U.S. Nat. Mus.*, iv, pp. 549 sqq. (revision).

1932. id., *Bull. U.S. Nat. Mus.*, no. 158, p. 524.

♀—Adult divided into 3 regions: expanded head, narrow neck, and dorso-ventrally flattened trunk. Abdomen minute, anal lamellae present. A pair of

posterior processes. Ovisacs long, cylindrical, multiseriate. Legs degenerate. In juvenile 2 pairs of antennae, the 2nd pair chelate; 2 pairs of maxillae, the 2nd pair uncinata, one pair uncinata maxillipeds.

♂—Curved or straight, unsegmented or feebly segmented. Two pairs of antennae, the 2nd pair chelate; 1st maxillae biramous, 2nd pair uncinata; maxilliped uncinata.

Exclusively on marine fishes. The females are usually attached near the dorsal fin, the vent, or in the gill chamber. The female in burrowing into the flesh of the host endeavours to reach one of the blood-vessels, usually the dorsal aorta. The males, having found the females, become more or less permanently attached to them.

Gen. *Sphyrion* Cuvier

1840. Milne Edwards, *Hist. Nat. Crust.*, iii, p. 525.  
 1900. Stebbing, *Mar. Invest. S. Afr.*, i, p. 59.  
 1912. Quidor, *Arch. Zool. Paris*, ser. 5, vol. 10, notes: pp. xxxix-xlii, figs.  
 1919. Wilson, loc. cit., p. 566.  
 1928. Leigh-Sharpe, *Parasitology*, xx, p. 179.  
 1932. Wilson, loc. cit., p. 530.  
 1914. Tyvold, *Bergens Mus. Aarb.*, 1914-15, pp. 1 sqq., figs.

♀—Head (cephalothorax) greatly expanded laterally, more or less hammer-shaped, but variable. Trunk much expanded, dorso-ventrally flattened, often pitted. Abdomen obsolete, anal lamellae knob-like. Posterior processes profusely branched.

♂—Body folded upon itself, unsegmented.

*Remarks.* Wilson admits only two species: *laevigatum* Guérin-Mén. and *lumpi* (Kröyer).

Both the *Preuss. Akademie Nomenclator* and Neave give Milne Edwards as the author of the genus. Stebbing and Wilson credit the genus to Cuvier; Stebbing quoting the French form 'Les Sphyrions', Wilson the Latin form. If Cuvier used the Latin form as well as the French, the case seems clear; but if not, the authorship of the genus should go to Guérin-Ménéville whose work is referred to by Milne Edwards and therefore antedates Milne Edwards (viz. 1839, *vide* Wilson, 1919. loc. cit., p. 568) (see Stebbing, loc. cit., p. 62).

*Key to the species*

- |   |                   |
|---|-------------------|
| 1. 'Hammer' knobbly, neck short, trunk broader than long. | <i>laevigatum</i> |
| 2. 'Hammer' smooth, neck long, trunk longer than broad.   | <i>lumpi</i>      |

*Sphyrion laevigatum* Guérin-Mén.

Fig. 33 a.

1871. Cunningham, *Tr. Linn. Soc. Lond.*, xxvii, p. 501, pl. 59, fig. 12 (*kingi*).  
 1900. Stebbing, loc. cit., p. 60, pl. 4 (♀).  
 1917. Brian, *Bull. Inst. ocean. Monaco*, no. 324, p. 3, text-figs. (♀).  
 1919. Wilson, loc. cit., p. 575.  
 1922. Philipps, *New Zeal. J. Sci. Tech.*, iv, p. 315, fig.  
 1928. Leigh-Sharpe, loc. cit., p. 182, fig. 3 (*kingi*).  
 1944. Brian, *An. Mus. Argent.*, xli, p. 199, pl. 9, figs. 76-81 (*kingi*).

♀—Hammer variously knobbed, no two specimens exactly alike, but knobs more or less symmetrically arranged. Neck relatively short, shorter than width of hammer in fully grown specimens; in one non-ovigerous specimen (S. Afr. Mus.), however, neck twice as long as width of hammer, and even if the hammer had grown wider the neck would have been relatively much longer than in normal specimens. Trunk in fully grown specimens broader than long.

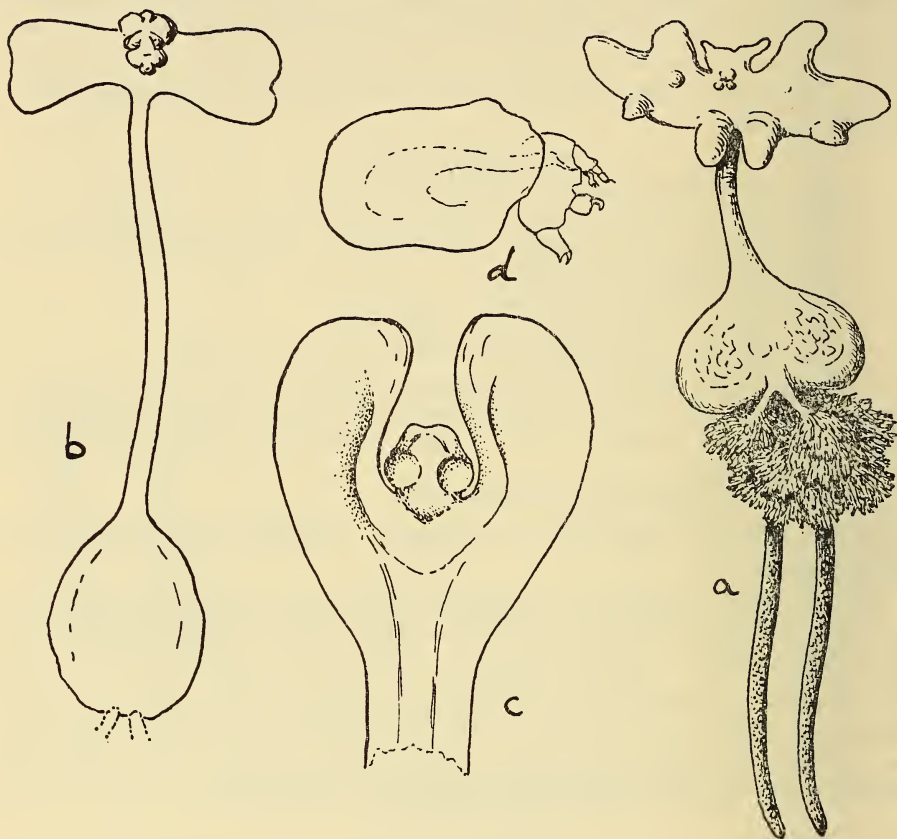


Fig. 33. *Sphyrion laevigatum* Guérin-Mén. a, ♀. *Sphyrion lumpi* (Kröyer). b, ♀ from *Antimora*; c, anterior portion ♀ from *Cottunculoides*; d, ♂ (redrawn from Wilson).

Largest specimen: width of hammer 28 mm., length of neck 10 mm., width of trunk 18 mm., ovisacs 40–50 mm. In the exceptional specimen mentioned above: width of hammer 12 mm., length of neck 25 mm., width of trunk 15 mm.

*Localities.* Off Table Bay and Cape Point, near the dorsal fin or vent of Macrurid fishes and King Klip (*Genypterus*) (S. Afr. Mus.); Agulhas Bank, on 'Cape Salmon' (probably *Atractoscion*) (Natal Museum); Cape Town, host unknown (Brian).

*Distribution.* North Atlantic, Antarctic, New Zealand.

*Remarks.* The exceptionally long-necked specimen is interesting. It was embedded near the vent of a Macrurid fish, but there is no obvious reason for the length of the neck, other specimens similarly situated having typical short necks.

Leigh-Sharpe maintains *kingi* distinct from *laevigatum* on account of the nodulose (4 pairs of processes) head, the swollen neck where it joins the trunk, and the posterior processes not being arranged in three 'series'. I do not think any of these characters will be found to be constant and distinctive enough for specific differentiation. Quidor's (1912) species should probably also become synonyms.

*Sphyrion lumpi* (Kröyer)

Fig. 33 *b-d*.

1845. Kröyer, *Danmarks Fiske*, ii, p. 517 (*Lestes l.*).  
 1913. T. & A. Scott, *Brit. Parasit. Copep.*, p. 164, pl. 51, figs. 3, 4.  
 1914. Tyvold, loc. cit., p. 12.  
 1919. Wilson, loc. cit., p. 570, pls. 50-2.  
 1928. Leigh-Sharpe, loc. cit., p. 179, fig. 1.  
 1932. Wilson, loc. cit., p. 530, fig. 315.  
 1939. Nigrelli & Firth, *Zoologica.*, xxiv, pl. 1, figs. 1-3, and pls. 1-4.  
 1948. Barnard, *Ann. Mag. Nat. Hist.* (xii), 1, p. 251.

♀—(large nearly complete specimen). Hammer smooth, head prominent, the ends of the hammer somewhat truncate and bilobed. Neck relatively very long. Trunk pear-shaped, longer than broad.

Width of hammer 25 mm., length of neck 35 mm., width of trunk 18 mm., length 22 mm.

(Anterior portion only.) Two lateral processes projecting forwards enclosing the head, which has 2 knobs on ventral surface but no indications of mouth-parts (cf. Leigh-Sharpe, fig. 1). Length 4 mm., width 3 mm.

*Localities.* Off Cape Point, on *Antimora australis* (Gadidae); (anterior portion) off Cape Point, 310-560 fathoms, behind pectoral fin of *Cottunculooides inermis*. (S. Afr. Mus.)

*Distribution.* Iceland (on *Cyclopterus*); Atlantic coast of North America (on *Sebastes*).

*Remarks.* The large specimen in the South African Museum had been named *laevigatum* by Stebbing, but not recorded by him. The specimen has been desiccated, and is not perfect, lacking the branched posterior processes. The smooth hammer and long neck seem to indicate its reference to this species.

The specimen consisting of only the anterior portion resembles fig. 3, in T. & A. Scott, but the horns of the hammer are relatively larger than the head.

Fam. SPHAERONELLIDAE

1897. Hansen, *Choniostomatidae*, pp. 1-206, 13 pls.  
 1910. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 562.  
 1930. Monod, *Senckenbergiana*, xii, 6, p. 336.

Minute parasites on Malacostracan Crustacea (Caridea, Mysidacea, Cumacea, Isopoda, and Amphipoda).

Gen. *Sphaeronella* Salensky1868. Salensky, *Arch. Naturg.*, xxxiv, p. 301.

1897. Hansen, loc. cit., pp. 4, 87 (in key), 98.

♀—Head small, more or less defined from the oval or globular trunk. Affixed to host by uncinata maxillae and maxillipeds. Abdomen absent. Legs small or wanting.

Parasitic in the brood-pouch of Cumacea, Isopoda, and Amphipoda.

*Sphaeronella capensis* Hansen1897. Hansen, loc. cit., pp. 100 (in key), 131, pl. 5, figs. 4 *a-c*, pl. 6, figs. 1 *a-d*.

1910. Stebbing, loc. cit., p. 562.

Size about half a millimeter.

*Locality.* Cape of Good Hope, in marsupium of the Amphipod *Lemboides afer* (Stebb.).

List of South African hosts with the parasites recorded from them in South African waters. In some cases the parasites recorded from other parts of Africa are included in [ ], but the list is not intended to be a complete list of all the parasites recorded from each host.

## MARINE

## Polychaet Worms

*Bispira volutacornis**Sabelliphilus bispirae*

Host ?

*Entobius euelpis*

## Echinoderms

*Amphipholis squamata**Cancerilla durbanensis*

## Crustacea (Amphipoda)

*Lemboides**Sphaeronella capensis*

## Ascidians

*Amaroucium erythraeum**Enterocola fulgens**Ascidia sydneyensis**Notodelphys allmani*,, *canaliculata*,, *weberi**Macroclinum angularum**Botryllophilus africanus**Microcosmus oligophyllus**Doropygus pulex**Polycitor renieri**Botryllophilus* sp.*Pyura stolonifera* ('Red Bait')*Doropygus pulex**Gunenotophorus globularis**Styela hupferi**Botryllophilus aspinosus*

## Pterobranchiata

*Cephalodiscus gilchristi**Zanctopus cephalodisci*

## Fishes

*Acanthias* (see also *Squalus*)*Achtheinus dentatus*,, *pinguis*

<i>Acanthopagrus berda</i>	[ <i>Caligus cossackii</i> ]
<i>Alopias vulpes</i>	[ <i>Dinemoura producta</i> ]
	<i>Nemesis pallida</i>
	[ „ „ <i>lamna</i> ]
<i>Anchoviella holodona</i>	<i>Caligus engraulidis</i>
<i>Antimora australis</i>	<i>Sphyrion lumpi</i>
<i>Arius dussumeiri</i>	<i>Caligus arii</i>
<i>Atractoscion</i>	<i>Sphyrion laevigatum</i>
<i>Austrosparus sarba</i>	[ <i>Caligus cossackii</i> ]
<i>Brama raii</i>	<i>Hatschekia acuta</i>
<i>Cantharus</i> see <i>Pachymetopon</i>	
<i>Carcharinus</i> ( <i>Carcharias</i> )	<i>Pandarus bicolor</i>
see also <i>Eulamia</i> and	„ „ <i>smithii</i>
Sharks unspecified	<i>Echthrogaleus coleoptratus</i>
	<i>Achtheinus dentatus</i>
	<i>Anthosoma crassum</i>
<i>Carcharodon</i>	<i>Alebion carchariae</i>
	<i>Nesippus alatus</i>
	<i>Achtheinus dentatus</i>
<i>Cetorhinus maximus</i> *	[ <i>Dinemoura producta</i> ]
	[ <i>Anthosoma crassum</i> ]
	[ <i>Nemesis lamna</i> ]
<i>Chrysophrys</i> see <i>Austrosparus</i>	
<i>Conger vulgaris</i>	[ <i>Congericola pallida</i> ]
<i>Congiopodus torvus</i>	<i>Chondracanthus congipodi</i>
	<i>Eubrachiella sublobulata</i>
<i>Coryphaena hippurus</i>	<i>Caligus coryphaenae</i>
<i>Cottunculoides inermis</i>	<i>Sphyrion lumpi</i>
<i>Cymatoceps nasutus</i>	<i>Clavellopsis fallax</i>
<i>Dentex</i> see <i>Petrus</i>	
<i>Diplodus cervinus</i> ( <i>trifasciatus</i> )	[ <i>Caligus ligusticus</i> ]
„ „ <i>sargus</i> ( <i>rondeleti</i> )	[ <i>Clavellodes macrotrachelus</i> ]
<i>Echeneis naucrates</i>	[ <i>Lepeophtheirus longipes</i> ]
<i>Engraulis</i> see <i>Anchoviella</i>	
<i>Epinephelus fuscoguttatus</i>	<i>Lernanthropus petersi</i>
<i>Eulamia acuta</i>	<i>Pandarus smithii</i>
<i>Exocoetus</i> species	[ <i>Pennella exocoeti</i> ]
<i>Galeorhinus canis</i>	<i>Pandarus bicolor</i>
	[ <i>Pseudocaligus apodus</i> ]
<i>Genypterus capensis</i>	<i>Sphyrion laevigatum</i>
<i>Germo alalonga</i>	[ <i>Pennella orthagorisci</i> ]
<i>Gymnosarda pelamydis</i>	<i>Caligus pelamydis</i>
<i>Isurus glaucus</i>	<i>Anthosoma crassum</i>
<i>Lepidion capense</i>	<i>Acanthochondria lepidionis</i>
<i>Lichia amia</i>	[ <i>Caligus mauritanicus</i> ]
	<i>Lepeophtheirus lichiae</i>
	[ <i>Nemesis lamna</i> ]
<i>Lophius piscatorius</i>	<i>Chondracanthus lophii</i>

\* 1948. Deboutteville, *Bull. Mus. Paris.*, xx, no. 5, pp. 446, 447.

<i>Macrurus</i> species	<i>Sphyrion laevigatum</i>
	„ <i>lumpi</i>
<i>Merluccius capensis</i>	<i>Chondracanthus merluccii</i>
	<i>Parabrachiella australis</i>
<i>Mola mola</i> and <i>lanceolata</i> *	<i>Lepeophtheirus insignis</i>
	<i>Cecrops latreillei</i>
	<i>Orthagoriscicola muricatus</i>
	<i>Philorthagoriscus serratus</i>
	<i>Pennella filosa</i>
	„ <i>orthagorisci</i>
<i>Mugil</i> species	<i>Achtheinus dentatus</i>
	<i>Lernanthropus paradoxus</i>
	<i>Brachiella</i> sp.
	<i>Achtheinus dentatus</i>
	<i>Lerneopoda galei</i>
	<i>Cardiodectes medusaeus</i>
<i>Mustelus</i> species	<i>Brachiella macrura</i>
<i>Myctophum</i> species	
[ <i>Neomaenis</i> (Congo)]	<i>Ancistrotos ostracionis</i>
<i>Orthagoriscus</i> see <i>Mola</i>	<i>Brachiella macrura</i>
<i>Ostracion cornutus</i>	<i>Clavella pagelli</i>
<i>Otolithus</i>	<i>Clavella pagelli</i>
<i>Pachymetopon blochii</i>	<i>Clavelloopsis fallax</i>
<i>Pagellus lithognathus</i>	[ <i>Caligus ligusticus</i> ]
„ <i>mormyrus</i>	[ <i>Clavelloopsis fallax</i> ]
<i>Pagrus</i> see <i>Cymatoceps</i>	
<i>Pelamys sarda</i>	<i>Caligus pelamydis</i>
<i>Petrus rupestris</i>	<i>Clavella denticis</i>
<i>Pliotrema warreni</i>	<i>Achtheinus pinguis</i>
<i>Plotosus anguillaris</i>	<i>Lepeophtheirus plotosi</i>
<i>Polynemus</i>	[ <i>Argulus dartevellei</i> ]
<i>Pomatomus saltator</i>	[ <i>Caligus mauritanicus</i> ]
[ <i>Pseudotolithus</i>	<i>Argulus alexandrensis</i>
<i>Raia marginata</i>	<i>Trebius caudatus</i>
<i>Rhinobatus</i>	<i>Lepeophtheirus</i> sp.
<i>Sargus</i> see <i>Diplodus</i>	
<i>Sciaena aquila</i>	[ <i>Caligus mauritanicus</i> ]
	[ <i>Lepeophtheirus longipes</i> ]
	[ <i>Sciaenophilus tenuis</i> ]
	[ <i>Polyrhynchus sciaenae</i> ]
	[ <i>Lernanthropus gisleri</i> ]
	[ <i>Brachiella sciaenophila</i> ]
<i>Scoliodon</i>	<i>Perissopus dentatus</i>
<i>Scopelus</i> see <i>Myctophum</i>	
<i>Scorpaenodes guamensis</i>	<i>Strabax monstrosus</i>
<i>Scylliorhinus</i> ( <i>Scyllium</i> )	<i>Pandarus armatus</i>
	<i>Achtheinus dentatus</i>
	„ <i>pinguis</i>

\* 1946. Dollfus, Essai de Catalogue des Parasites Poisson-lune *Mola mola* (L. 1758) et autres *Molidae*. *Ann. Soc. Sci. Nat. Charante-maritime*, n.s. III, fasc. 7. (Copepodes, pp. 70-2.)



<i>Seriola lalandei</i>	<i>Caligus lalandei</i>
<i>Serranus goliath</i> see <i>Epinephelus</i>	<i>Alebion carchariae</i>
Sharks unspecified	<i>Perissopus dentatus</i>
	<i>Dinemoura producta</i>
	" <i>latifolia</i>
	<i>Achtheinus dentatus</i>
	<i>Charopinus dubius</i>
Skate unspecified	
<i>Sparus</i> see <i>Acanthopagrus</i>	<i>Argulus belones</i>
<i>Sphyaena commersoni</i>	[ <i>Caligus affinis</i> ]
	<i>Pandarus cranchii</i>
<i>Sphyrna</i> species	<i>Pandarus armatus</i>
	" <i>cranchii</i>
	[ <i>Nemesis robusta</i> ]
<i>Squalus acanthias</i>	<i>Caligus coryphaenae</i>
	<i>Achiheinus dentatus</i>
	<i>Pandarus cranchii</i>
<i>Stegostoma fasciatum</i>	
<i>Temnodon</i> see <i>Pomatomus</i>	<i>Caligus tetrodontis</i>
<i>Tetrodon hypselogeneion</i>	<i>Lepeophtheirus brachyurus</i>
	[ <i>Pennella filosa</i> ]
<i>Thunnus thynnus</i>	<i>Medesicaste penetrans</i>
<i>Trigla</i> species	<i>Clavellopsis hostilis</i>
<i>Umbrina robinsoni</i>	[ <i>Pennella filosa</i> ]
<i>Xiphias gladius</i>	[    " <i>crassicornis</i> ]
	[ <i>Argulus zei</i> ]
<i>Zeus</i>	
<i>Zygaena</i> see <i>Sphyrna</i>	
Mammals	
<i>Balaenoptera acutorostrata</i>	<i>Pennella crassicornis</i>
"    species	" <i>balaenopterae</i>

## FRESH WATER

Amphibians	
Tadpoles	<i>Dolops ranarum</i>
Fishes	
<i>Barbus</i> sp.	<i>Lernaea barbicola</i>
<i>Barbus gunningi</i> and <i>swierstrae</i>	<i>Dolops ranarum</i>
Cichlidae	[ <i>Chonopeltis inermis</i> ]
	[ <i>Lernaea</i> ]
	[ <i>Lamproglena</i> ]
<i>Eutropius</i>	<i>Dolops ranarum</i>
<i>Gnathonemus</i>	<i>Chonopeltis inermis</i>
<i>Heterobranchus</i>	[ <i>Dolops ranarum</i> ]
<i>Huro salmonoides</i> (imported)	<i>Dolops ranarum</i>
<i>Hydrocyon</i>	[ <i>Argulus</i> ]
[ <i>Lates</i>	<i>Dolops ranarum</i> ]
<i>Marcusenius</i>	<i>Chonopeltis inermis</i>

[ <i>Micropterus dolomieu</i> (imported)]	<i>Achtheres micropteri</i> ]
[ <i>Polypterus</i>	<i>Lernaea haplocephala</i> ]
<i>Protopterus</i>	[ <i>Dolops ranarum</i> ]
<i>Sandelia capensis</i>	<i>Argulus capensis</i>
<i>Serranochromis thumbergi</i>	[ <i>Lamproglana</i> ]
<i>Synodontis melanostictus</i>	<i>Chonopeltis inermis</i>
<i>Tilapia mossambica</i> and other species	<i>Dolops ranarum</i>
	[ <i>Lernaea</i> ]